Task ID # 2611

Notice of Intention To Commence Large Mining Operations
&
Plan of Development

Oil Shale Exploration Company, LLC
White River Oil Shale Mine
Uintah County, Utah
Phase 2 RD&D Operations

August 2008

Submitted by:

Oil Shale Exploration Company, LLC
3601 Spring Hill Business Park, Suite 201
Mobile, Alabama 36608

Submitted to:

Utah Dept. of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

&

Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101

Prepared by:

JBR Environmental Consultants, Inc.
8160 S. Highland Drive
Sandy, Utah 84093
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0004

Task ID# 2611

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August 29, 2008

Ms. Leslie Heppler
Utah Division of Oil, Gas and Mining
1594 W. North Temple, Suite 1210
PO Box 145801
Salt Lake City, Utah 84114-5801

Re: White River Mine, M0470092, Task 2159, Uintah County, Utah

Dear Leslie:

The enclosed Notice of Intention/Plan of Development (NOI/POD) for the White River Mine, Phase 2 RD&D Operations, is being re-submitted to the Bureau of Land Management (BLM) and Utah Division of Oil, Gas and Mining (DOGM) by JBR Environmental Consultants, Inc. (JBR) on behalf of Oil Shale Exploration Company (OSEC). The original NOI (submitted December 2007) and original POD (submitted January 25, 2008) have been combined and revised based upon DOGM comments dated February 26, 2008 and official BLM comments received May 30, 2008, as well as additional information obtained since the draft POD submittal, and input from OSEC and the various consultants to OSEC.

We look forward to meeting with you on September 11 to discuss your review and approval of this Plan. Feel free to contact Gary Aho (970.618.0294) or Linda Matthews (801.943.4144) if you have any comments or questions regarding this submittal.

Sincerely,

Linda Matthews
Project Manager
JBR Environmental Consultants, Inc.

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SEP 02 2008
DIV. OF OIL, GAS & MINING

Enclosure
Cc: Gary Aho, OSEC

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Notice of Intention to Commence Large Mining Operations

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Plan of Development

Oil Shale Exploration Company, LLC
White River Oil Shale Mine
Uintah County, Utah
Phase 2 RD&D Operations

Introduction

The Oil Shale Exploration Company, LLC (OSEC, LLC) holds a federal mineral lease (UTU-84087) for a Research Development and Demonstration (RD&D) project to test the feasibility of commercial oil shale development. The lease covers a 160-acre tract located approximately 55 miles south of Vernal, Utah (Figure 1) in T10S, R24E, Sections 22 and 27, on land managed by the Bureau of Land Management (BLM). OSEC, LLC also holds a preferential lease right to a contiguous 4,960 acres for commercial development of the oil shale, pending further review of economics and environmental concerns. The preferential lease right is not a part of the Phase 2 RD&D operations for which approvals are currently being sought.

OSEC, LLC is a subsidiary of Oil Shale Exploration Company, a Delaware corporation and indirectly owned by four US firms: Energy Investments, Unlimited; Twin Pines Coal Company, Inc., of Alabama; Pine Mountain Holdings, LLC; and Shale Investments, LLC, of Utah. These four firms have significant investments and experience in coal mining and alternative energy fuels. The company plans to eventually complete a three-phase RD&D program (the second phase is the only phase addressed herein) at the White River Mine using a thermal processing technology to demonstrate the feasibility of processing oil shale into a synthetic crude oil suitable as refinery feedstock to make high-quality transportation fuel, and other products. This process converts solid kerogen material found in oil shale rock into hydrocarbon vapor, high BTU gas, and carbon char. The vapor is condensed to form shale oil, the gas is used for process heat or is sold, and the char is burned for retort heat.

Exploration and development of this RD&D tract first occurred in the mid-1970s with the White River Shale Project (WRSP). Subsequently, the White River Shale Oil Company (WRSOC; Phillips, Sun, and Sohio) improved the road from Vernal and constructed a new bridge over the White River. Mine development began in 1981 with construction of a vertical shaft and a decline into the Mahogany mining horizon. An earthen retention dam was constructed down-gradient of the development area for water and sediment control. An office/warehouse building was constructed, as well as plants for water treatment and sewer treatment. OSEC, LLC was not involved in the WRSP.

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The WRSP was terminated in 1985 due to economic conditions, and the original leases were relinquished. In the mid-1990s, the BLM began closure activities, which included installing a 10-foot thick bulkhead in the lower decline, capping two shafts, and removing the hoist and headframe. Approximately 50,000 tons of mined oil shale and 19,400 cubic yards (CY) of salvaged topsoil were left stockpiled within the lease area.

Under the umbrella of the BLM's RD&D program, OSEC, LLC will use this site and the existing infrastructure for a demonstration project to test the viability of a surface retorting process; the initial process selected is the Alberta Taciuk Process (ATP), which is a rotary kiln retort system. The RD&D plan has three phases, and was the subject of a 2007 Environmental Assessment (EA) (BLM 2007). This combined Notice of Intention and Plan of Development (NOI/POD) has been prepared to obtain Utah Division of Oil, Gas, and Mining (DOGM) and BLM approval for only Phase 2 of the RD&D project. However, each of the phases is briefly described below to provide a broader context.

Phase 1 of the RD&D project involved transporting approximately 300 tons of oil shale previously stockpiled at the mine site to Calgary, Alberta, Canada for pilot process testing with the ATP four-ton-per-hour (4 TPH) pilot plant. Little to no additional impact to the mine site and surrounding lands occurred during this activity. DOGM granted OSEC, LLC a one-time exemption from permitting requirements for this phase of the project. This pilot plant testing was completed in September 2007. Phase 1 is not discussed further in this NOI/POD.

Phase 2 of the RD&D project is the focus of the current permitting effort. It is expected to take approximately 8 to 14 months to complete. It involves continued testing with the same ATP 4 TPH pilot plant that was used in Alberta during Phase 1 of the RD&D project. In Phase 2, this 4 TPH retort pilot plant will be brought from Alberta to the White River Mine Site for use. Up to approximately 10,000 tons of oil shale from the White River Mine will be processed, generating up to 6,400 barrels of crude shale oil. Some (approximately 8,000 tons) of the oil shale is expected to come from the previously mined oil shale that is currently stockpiled on the site, and some (approximately 2,000 tons) from fresh oil shale that is newly mined. In order to obtain fresh oil shale, OSEC, LLC will need to re-open shafts, declines, and other existing mine facilities; this is also included as part of Phase 2 RD&D project. Lastly, during this phase, several existing surface facilities will be reopened and new facilities (including a spent shale disposal facility capable of storing up to 8,000 tons of spent shale) will be constructed. It is these Phase 2 RD&D activities that are covered by this NOI/POD, and for which approvals are currently being sought.

Approval for Phase 3 of the RD&D project is not being requested at this time. It would move forward if the results of Phase 2 RD&D are favorable, and all necessary permits are acquired. This phase involves design, permitting and construction of a larger 250-TPH ATP demonstration plant (material handling systems, retort, upgrader and related support equipment including storage tanks). An electrical transmission line is planned for construction, and either propane tanks or a link to a natural gas pipeline will be used for the retort and shale oil processing equipment. An additional approximately 2.7

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million tons of oil shale could be mined during Phase 3 of the RD&D project, over an approximate two-year operating period. This could require a spent shale stockpile of approximately 2.2 million tons, covering 38 acres. Phase 3 of the RD&D project is not covered under this NOI/POD; it would require additional agency approvals.

This combined Notice of Intention and Plan of Development (NOI/POD) is submitted to the Utah Division of Oil, Gas and Mining (DOGM), and the Bureau of Land Management (BLM) by the Oil Shale Exploration Company, LLC (OSEC, LLC). It has been prepared in compliance with part R647-4-103 of the Utah Minerals Reclamation program and as required by 43 C.F.R. Part 3590. Document arrangement, formatting, and section headings follow the State's R647-4-103 regulations, but all necessary aspects of the 3590 federal requirements are also addressed herein. OSEC, LLC will not conduct any operations at the site other than those described herein, and for which DOGM and BLM have granted approval. The large majority of these operations will occur on ground that has already been disturbed. OSEC, LLC understands that any modifications to this document or to plans described herein and approved will require written approval from BLM and DOGM.

Only Phase 2 of a three-phase RD&D project is being considered in this NOI/POD. Phase 1 has already been conducted and approvals for Phase 3 would be sought at a later date depending upon the outcome of Phase 2. The Phase 2 RD&D mining and processing operation is located in Uintah County, Utah, on a 160-acre lease located approximately 55 miles southeast of Vernal, Utah (Figure 1) in T10S, R24E, Sections 22 and 27 (Figure 2). Existing off-lease roads and an existing off-lease runoff and sediment retention pond will also be used during Phase 2 RD&D operations (Figure 3); OSEC, LLC has been granted rights-of-way to use these.

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Notice of Intention to Commence Large Mining Operations¶

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Oil Shale Exploration Company, LLC¶

White River Oil Shale Mine¶

Uintah County, Utah¶

Phase 2 RD&D Operations¶

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R647-4-104. Operator(s), Surface and Mineral Owner(s)

104.1. Responsible Operator Information

Lease Holder and Operator

Oil Shale Exploration Company, LLC
3601 Spring Hill Business Park, Suite 201
Mobile, Alabama 36608
(251) 460-0069

Registered Agent

CT Corporation System
136 East South Temple, Suite 2100
Salt Lake City, UT 84111
(801) 364-5101

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Company Representative

Gary D. Aho, Vice President, Operations
Oil Shale Exploration Company
PO Box 1211, 818 Taughenbaugh Boulevard, Suite 105
Rifle, CO 81650
(970) 625-2445

104.2. Ownership Information

Location of Proposed Activities:

Uintah County
T10S, R24E, Sections 22 & 27

Ownership of Land Surface:

US Department of the Interior
Bureau of Land Management

Vernal Field Office
170 South 500 East
Vernal, UT 84078
435-781-4400

Owner of Minerals:

US Department of the Interior
Bureau of Land Management

Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101
801-539-4036

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435-781-4400

104.3. Claim and Lease Information

BLM Environmental Assessment Number:

UT-080-06-280

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BLM RD&D Lease Number:

UTU-84087

BLM Off-Lease Rights-of-Way Associated with Phase 2
UTU-85857 (for earthen retention dam/pond site and drainage channel)
UTU-85858 (for eight access roads of variable widths)
UTU-85859 (for electrical building lay-down yard)

Adjacent Land Owners:

BLM Vernal Field Office
170 South 500 East
Vernal, UT 84078
435-781-4400

The above-named surface and mineral owner has been notified in writing about this project. OSEC, LLC has the legal right to enter and conduct mining operations on the land covered by this NOI/POD, subject to BLM's approval. Based upon a signed RD&D lease with the federal government acting through the BLM, all activity on the lease site is subject to BLM approval. A copy of the RD&D lease is provided in Appendix A.

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R647-4-105. Maps, Drawings & Photographs

Maps, drawings, and photographs are included in this submission to better illustrate the existing site conditions and OSEC, LLC's Phase 2 RD&D operations. These include: a topographic base map, and more detailed design topography for certain features; an existing site layout map and photographs documenting existing conditions; a Phase 2 RD&D operations map; geology and mine re-opening figures; and various process diagrams, among others.

R647-4-106. Operation Plan

106.1. Mineral to be Mined

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OSEC, LLC plans to process up to 10,000 tons of oil shale during Phase 2 RD&D. Some of this amount (approximately 8,000 tons) will be obtained from previously mined oil shale that is currently stockpiled at the site, and some (approximately 2,000 tons) will be newly mined oil shale that will be mined after the existing underground mine is re-opened. Processing results in the solid hydrocarbon kerogen (about 18% by weight of the oil shale feed) being converted to product shale oil, hydrocarbon gases and flue

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gases; 2% connate water (water trapped in the shale's pores); and 80% spent shale by weight of ore.

With regard to maximum recovery, it is noted that this Phase 2 RD&D project is a pilot project whose goal is to demonstrate the technical, economic, and environmental feasibility of technology to extract liquid energy fuels from oil shale on public lands. Should this RD&D project be successful, it will increase the likelihood of maximum recovery of oil shale on this lease.

106.2. Operations Description for Phase 2 RD&D

The Phase 2 RD&D operations described in this section include extensive mine re-opening and inspection tasks, underground mining, feedstock preparation, oil shale processing, and waste handling. These activities are scheduled to be completed within 8 to 14 months. On-site activities will occur within the 160-acre lease area and additional off-lease ground covered by rights-of-way (Figure 2). Almost all of these activities will occur within land that has already been disturbed by previous site development and mining. Table 1 summarizes the areas that OSEC, LLC will disturb. At all times during Phase 2 RD&D operations, the site will be maintained in a clean and safe condition.

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Table 1 Acreage Associated With Phase 2 RD&D Operations

	On-Lease (acres)	Off-Lease (acres)	Combined (acres)
Previously Disturbed Acreage Reoccupied by OSEC, LLC	47.7	24.4	72.1
Acreage Newly Disturbed by OSEC, LLC	4.3	0.0	4.3
Total Phase 2 Disturbance	52.0	24.4	76.4

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The White River Mine was originally developed and operated by others in the 1980s, and much of the infrastructure remains from those operations. Figure 4 shows the existing site topography, layout, and surface facilities. Photographs of the site as it currently exists are included in Appendix B. As shown, two raw oil shale stockpiles are located in the northwest corner of the lease. Combined, they contain about 50,000 tons of oil shale mined during the previous operations. OSEC, LLC will reuse some of the existing surface facilities, and re-open the underground mine, including the existing 30-foot diameter main shaft, decline, ventilation shaft, and utility raise. These re-opening tasks are described in Section 106.2.1. OSEC, LLC will also use the BLM's existing earthen retention dam to impound water as the mine is dewatered.

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To begin production, OSEC, LLC's Phase 2 RD&D program will initially use ore from the southern-most of the two existing stockpiles. Once the mine is re-opened, OSEC, LLC, will obtain fresh oil shale from across the ore horizon, as described in 106.2.2. Oil shale obtained from either of these sources will be crushed and screened using a portable crushing and screening plant that will be brought to the site, as discussed in Section 106.2.3.

OSEC, LLC will disassemble and relocate the 4-TPH ATP pilot plant that was used during Phase 1 of the RD&D project and erect it at the White River Mine for Phase 2 RD&D processing. Once relocated, the plant will operate for about eight months, processing approximately 10,000 tons of oil shale as a retort demonstration test. Based upon that quantity, Phase 2 RD&D processing will result in the production of approximately 6,400 barrels of product (crude shale oil). No refining or upgrading of raw shale oil will be performed on the site during Phase 2 RD&D operations. Instead, all crude shale oil will be moved off site for testing, sale or disposal. The processing operations are described in Section 106.2.4.

In addition to product, Phase 2 RD&D operations will result in about 8,000 tons of solid waste (spent shale). OSEC, LLC is currently researching technically and financially viable uses for the spent shale. However, under Phase 2 RD&D, OSEC, LLC has committed to constructing a research disposal facility that is lined and isolated from the environment, and that also includes leachate monitoring and spent shale characterization programs. To this end, an engineered valley-fill, lined impoundment has been designed for spent shale disposal, as described further in Section 106.2.5. The monitoring and characterization plans will be placed in Appendix C when they are available.

Phase 2 RD&D operations areas and facilities are shown in Figures 5A and 5B. This phase has been designed to minimize the amount of new ground disturbance by using the existing graded pad surfaces and facilities where feasible.

Authority for enforcement of federal environmental laws in what is referred to as "Indian Country" generally falls to the Environmental Protection Agency (EPA). OSEC, LLC's lease is located within this defined "Indian Country". ENVIRON International Corporation (ENVIRON) has carried out extensive discussions regarding discharge permits under both the federal Clean Air and Clean Water Acts with EPA Region 8 staff on OSEC, LLC's behalf. ENVIRON has received informal comments from Region 8 staff regarding both of these permitting matters; however, no written, definitive determinations have been provided by EPA, and Region 8 has stated that it is not willing to do so. As a result of these discussions, however, EPA has advised ENVIRON that a permit under the Clean Air Act is not required due to the short duration of the pilot operation in Phase 2 of the RD&D project, and OSEC, LLC is committed to installing air emission control systems during Phase 2 RD&D. Further, in these discussions, EPA has indicated that it does not intend to make a jurisdictional determination on the wash or the area upstream of the earthen retention dam relative to potential Clean Water Act permitting requirements. Recognizing that the drainage that will receive all discharge is

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an impounded, ephemeral drainage and because of the uncertain effect of the U.S. Supreme Court's decision in Rapanos v. United States in this instance, Region VIII staff informed ENVIRON that EPA would not make a jurisdictional decision regarding the need for a permit for discharge into the unnamed drainage impounded by the earthen retention dam. Instead EPA recommended that OSEC, LLC determine whether or not a National Pollutant Discharge Elimination System (NPDES) permit will be needed. Accordingly, OSEC, LLC, has determined that an NPDES permit for discharge into the impounded drainage will not be sought.

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106.2.1. Mine Re-opening

The existing underground mine encountered the oil-shale-bearing Mahogany Zone at a depth approximately 1,000 feet below ground surface. Figures 6, 7A, 7B, and 8 provide geologic section information and ore grade information, which OSEC, LLC has used in their Phase 2 RD&D planning.

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OSEC, LLC plans to reopen and use the existing underground mine facilities left from previous mine development activities. These existing facilities include:

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- a 30-foot diameter, 1,058-foot deep, concrete-lined vertical mine shaft;
- a 4,574-foot long, three-segment decline that accesses the oil shale horizon;
- a 16-foot diameter, 70-foot deep ventilation shaft located near the decline portal; and
- a 5-foot diameter, 400-foot deep utility raise located at the intersection of the upper and lower legs of the decline.

As a result of the BLM's mine abandonment program in the mid-1990s, the decline portal is currently plugged with dirt and rock. The lower leg of the decline has a 10-foot-thick reinforced concrete bulkhead in place, and the ventilation shaft and the utility raise have concrete caps. The main mine shaft was not capped during mine abandonment, but is secured with a perimeter fence and a chain link fence lain horizontally over the shaft. The exact location of the bulkhead was not recorded by the BLM when constructed; however, it was located approximately 3,000 feet in from the portal. The existing surface infrastructure associated with the shafts is shown on Figure 4. The underground mine layout as it is understood to exist is shown in Figure 9 as a cross-section schematic and in Figure 10 as a plan view.

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The White River Mine was classified as gassy by the Mine Safety and Health Administration (MSHA) because of two methane ignitions during the previous development work. (Due to a change in MSHA regulations at 30 CFR part 57, Subpart T, it has been reclassified as a Category 1, Subcategory 1-A mine.) Later, there were

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two explosions at the mine, one in 1995 while a contractor was attempting to cap the main shaft during mine closure and a later one that was probably caused by lightning.

OSEC, LLC's plan for re-opening the White River Mine is designed to meet the highest health and safety standards possible. OSEC, LLC will develop a detailed Health, Safety, and Environment (HS&E) plan for all activities for the duration of operations at the site. The plan will include emergency response procedures for the site and for the mine. This HS&E plan will be provided to DOGM and BLM once it is completed for placement in Appendix D. Further, throughout all aspects of this mining project, OSEC, LLC will follow all applicable regulations, requirements, and guidelines established by MSHA. That agency will have the primary jurisdiction over all safety-related aspects of this mine. They will approve the mine design, mining methodology, ventilation plan, and roof control plan, among other mining related aspects of Phase 2 RD&D. No regulated activities will take place until that agency has granted approval for such activities. Copies of these MSHA-approved plans will be provided for placement in Appendix D. In all cases, safety will be the primary consideration as re-opening proceeds.

The eight stages of the mine re-opening activity are described below. As will be seen, some of the Stage 1 tasks have been completed. Those tasks were done under separate BLM approvals and were of a nature that did not require DOGM approval.

Stage 1: Mine Characterization

In March 2008 OSEC, LLC acquired water level, water quality and air quality data through the 30-foot-diameter main shaft using a down-hole video camera and water collection devices. The water level in the shaft was measured at 1,033 feet below the shaft collar. The down-hole video camera revealed no visible oil floating on the water surface and about 2 feet of debris at the bottom of the shaft. The down-hole video camera showed no apparent damage to the shaft's concrete liner. Water samples were obtained by a qualified technician from MWH Americas, Inc. (MWH) and the samples were analyzed by ACZ Laboratories in Steamboat Springs, CO. (Results of the water sampling are discussed in Section 109.1, below.) A permanent air monitoring system has been installed, which will allow OSEC, LLC to routinely monitor gas at the bottom of the 30-foot shaft. All of these tasks were done under separate BLM approvals and were of a nature that did not require DOGM approval.

Under this NOI and POD, approval for an additional Stage 1 task is being sought. Prior to reopening the mine, air quality data will be obtained from beneath the concrete caps on the 16-foot ventilation shaft and the 5-foot utility raise using the same sampling tube procedure used in the on-going 30-foot shaft bottom air quality testing. This method will involve the placement of a tube through the vent pipe to the desired depth in the shaft, and obtaining the air sample using a vacuum pump to draw the sample through the tube.

Stage 2: Mine Dewatering

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¶
Mine water quality sampling in the shaft and lower mine workings will be done after the methane sampling tube is installed in the 30-foot diameter shaft and air sampling results indicate that it is safe to do so. It is anticipated that bitumen oil from the oil shale formation is floating on the surface of the underground mine pool. The distance from the ground surface to the shaft-bottom-fluids will be measured as well as the thickness of the oil layer and depth of the water. Water levels will be measured using a depth probe and an oil/water interface probe may be lowered from the surface into the shafts to determine if any measurable product is present. A subsurface sampler, developed for oil-field use, will be lowered into the shaft on a wire-line, and 600 ml samples will be collected at predetermined depths below the water surface. The system allows for clean samples to be obtained below the oil-water interface; the oil layer will also be sampled. The water quality testing will include hydrocarbon compounds including volatile organic compounds (VOCs), major ions including sulfate, total dissolved solids (TDS), trace metals, and other possible organic and inorganic pollutants. ¶
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A down-hole video camera will also be lowered into the 30-foot shaft to inspect the shaft wall conditions. Air quality will be recorded using a methane monitor attached below the camera.¶

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Water from underground sources has pooled in two locations within the mine (the lower mine workings and above the Decline C bulkhead), and will need to be removed as part of the mine re-opening process. Dewatering is estimated to take approximately 2.5 months, and a total of 18.3 million gallons (16.0 million gallons from the mine workings and 2.3 million gallons from above the bulkhead) is expected to be pumped to the surface. A dedicated, portable 1 MW diesel generator located near the 16-foot ventilation shaft will supply power for the pumping operation.

Once the groundwater is pumped to the surface, it will be discharged to the adjacent dry wash and be conveyed to the existing earthen retention dam (Figure 5B). Water removed from the decline portal and from the 30-foot main shaft will be conveyed to the wash via two short (approximately 300 feet long) pipelines, as shown on Figure 5A. These lines will be flexible plastic pipe with a diameter of between six and eight inches. Their outlets will be placed at the edge of the wash, and flows from these pipes would be controlled to a velocity that does not erode the drainage bed or side slopes. The natural drainage is located, as shown on Figure 5A, east of the road that leads from the plant site to the southernmost oil shale stockpile and west of the 30-foot shaft and decline portal pads. Blue arrows on Figure 5A indicate the natural flow path and show that this drainage continues north and then west around the north of the southernmost oil shale stockpile. The wash then continues to the large earthen retention dam (See Figures 3 and 5B for this alignment). As shown in Figures 2 and 5B, segments of this wash coincide with a former roadway (no longer functional or drivable). Along the short segment of roadway/drainage channels between the two oil shale stockpiles, riprap will be placed as necessary to provide for erosion protection and protection of the road locally so as to maintain access to the southernmost oil shale stockpile.

Water from the Birds Nest Aquifer that may be pooled above the bulkhead should be of relatively good quality. The volume of this water could be as much as 2.3 million gallons. As the crew advances down from the portal, this water will be pumped up the declines through a steel discharge line to the surface, and discharged to the dry wash as mentioned above.

The water level in the mine was previously reported by the BLM to be about eight feet above the bottom of the main shaft. More recent measurements by OSEC, LLC indicated that the water level is now about 23 feet above the shaft bottom. Since most of the underground development workings are flooded, OSEC, LLC has estimated that approximately 16 million gallons of water may be in the lower flooded portion of the mine. The mine will be dewatered using submersible pumps. Although the exact procedure will be left to the discretion of the contractor, it is likely that they will work down from the shaft station through the access ramp to the crusher chamber using a portable submersible pump to move the water up to a temporary sump (stock tank) at the bottom of the shaft. The water can then be pumped from the temporary sump up the shaft using the pump that will already be installed to dewater the upper portion of the underground workings. This approach minimizes the distance and subsequently the power required to pump that water to the surface. Continuing to advance down the lower decline will require an intermediate staged or relay pump to get the water up to

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Deleted: Some of this groundwater may be contaminated with hydrocarbon compounds. The feasibility of separating this oil from the water prior to disposal will be investigated. Any water, regardless of its source, that does not meet standards for surface discharge will either be collected in tanks and trucked by licensed operators to an off-site, licensed disposal facility, or treated before discharge on site. If the intercepted groundwater's quality meets state and federal standards, it will be discharged into the drainage leading to the existing earthen retention dam to the north of the 160-acre RD&D lease. More details on potentially applicable water quality standards and discharge permits are provided in Section 107.2.¶

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the high pressure pump at the intersection of the two declines. Specifications for the pump, in-mine discharge lines, line support, etc. will be the responsibility of the contract operator and will be determined prior to the dewatering task. Once removed, this water will be handled as described above and sent to the earthen retention dam.

Some of this groundwater may be contaminated with hydrocarbon compounds associated with the known bitumen seep that exists in the lower portion of the mine. Other volatile organics, including trichloroethene and tetrachloroethene, were detected in two recent groundwater samples obtained during the Stage 1 characterization described above. These constituents may be present as a result of equipment that was left in the mine, and are generally thought not to be extensive in nature. There is no known ongoing source for these compounds at the site. As the water is discharged to the dry wash, bitumen-related hydrocarbons would be removed using an oil-water separator; natural aeration is expected to be successful at volatilizing the majority of the volatile organic compounds. To verify this, samples of water will be collected from upstream of the dam on a bimonthly schedule, and will be analyzed for the same suite of volatile organics as was previously analyzed. Should results indicate that significant levels of these compounds remain in the ponded water, additional treatment methods such as air-sparging will be considered.

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The TDS of the groundwater is also expected to be relatively high, based upon the recent sampling mentioned above (results for which are included in Appendix E). The results of the sampling showed TDS levels to be ~ 6000 mg/L. However, it should be noted that TDS levels in the Birds Nest aquifer are naturally high as well. Testing during the original investigations of the site showed TDS concentrations in the Birds Nest aquifer to be up to 4,100 mg/L near the site (Dynamac Corporation 2002).

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Once the groundwater reaches the earthen dam, it will reside there until it has evaporated or infiltrated. Any leakage beneath or through the earthen retention dam would be collected in the existing seepage collection pond, which was built for that purpose. As needed, OSEC, LLC would pump back any intercepted groundwater from the seepage collection pond to the area upstream of the earthen retention dam. To ensure that this system is fully functional, OSEC, LLC will revamp the existing collection system as necessary, by reinstalling a pump, and taking any other necessary measures.

Stage 3: Ventilation System

Prior to any work occurring under this stage, approval will be obtained from MSHA on the ventilation plan. The ventilation plan will address details including: clearing methane accumulation, sequence of cap removal, accounting for natural ventilation, sampling program and protocol, cut-off limits, and contingency plans, among other items. Copies of this plan and the MSHA approval will be placed in Appendix D when they become available. OSEC, LLC also understands that BLM wishes to have approval authority over this ventilation plan. Establishing the mine ventilation system will begin with removing the concrete caps from the utility raise and the ventilation shaft. Frequent air

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quality measurements will be made through the vent pipes located in the concrete caps before and during the opening of the main ventilation shaft and the utility raise. To insure crew safety, these areas will be purged by blowing air down the utility raise vent pipe and exhausting the air through the ventilation shaft pipe to clear any methane concentration greater than one percent that might remain beneath the caps during cap removal.

The concrete and steel cap on the utility raise will be removed using a large track-hoe and concrete breaker. The re-opened utility raise will then serve as the temporary ventilation exhaust shaft. The steel-reinforced concrete cap on the ventilation shaft will be removed using a hydraulic concrete breaker; rebar will be cut using a hydraulic steel-cutting demolition shear.

OSEC, LLC will install a main pressure (intake) fan at the top of the ventilation shaft. Power to the fan will be provided by a portable 1 MW diesel-powered generator, which will be located immediately south of the ventilation shaft. The upper decline (also known as the A decline) will be ventilated prior to removing the portal plug. The fan will be sized to provide adequate ventilation during the reentry operations and subsequent evaluation operations. Fan size (cubic feet per minute, or CFM), flow control, etc. will be addressed in the MSHA-approved ventilation plan.

Stage 4: Portal Plug Removal

Mine reentry work will begin when the ventilation system is operating and the lower mine workings are partially dewatered. With the ventilation intake fan operating and air exhausting through the utility raise, a front-end loader and track-hoe will be used to excavate the backfilled earth and rock in the portal plug. The plug is expected to consist of approximately 4,500 CY of earth and rock. The removed material will be stockpiled near the portal as shown on Figure 5A, and reused for mine closure and backfilling activities as described in the reclamation section of this NOI/POD. While the BLM has indicated that there may be some topsoil-quality material comprising this plug, neither its quantity nor its characteristics are known, so it is presently assumed that all of this material is more suitable as mine waste than as reclamation topsoil. If the material, once removed, appears to have easily separable components that are evidently sufficient quality and quantity as topsoil, this material will be stored separately by hauling it to the existing on-lease topsoil stockpile, and tested before use. However, all calculated quantities for backfill and topsoil are based upon the assumption that all of this material is mine waste, not topsoil. Air quality will be monitored frequently at the bottom of the ventilation shaft during the plug removal.

Once the plug has been removed, the two air-lock doors can be accessed. The outer door is located about 30 feet inside the portal, and the inner door is located about 105 feet inside the portal. Extreme caution will be used as the outer and inner air-lock doors are re-opened because of the unknown air quality in the space between the doors and between the inner door and the ventilation shaft. The initial air monitoring done during mine characterization will provide information as to what may be encountered during the

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opening of the air-lock doors. After the doors are opened, temporary travel curtains will be installed before work continues in the upper decline. These temporary travel curtains will facilitate air control (i.e., preventing air from flowing directly out the portal) without relying totally on the doors. The air doors will be repaired and made operational as reentry work progresses down the decline. With the knowledge that these doors are very heavy and require mechanized assistance to open, the fore-mentioned generator will be used as needed to provide supplementary power for this task. However, it will be the responsibility of the hired mine contractor to determine the best and safest specific way to operate these doors.

Stage 5: Upper Decline Re-entry

With the ventilation system operating, as shown in Figure 11A, OSEC, LLC's contract mine crew will begin to advance, with caution, down the decline, frequently testing air quality, roof and rib integrity, and making repairs as needed. A power line, communication line, and pump discharge line will be installed as the work progresses to the far end of the upper decline.

Stage 6: Lower Decline Re-entry

Once the advance crew reaches the upper end of the lower decline (also known as the C decline), any accumulated water will be sampled and sent out for laboratory analysis. The BLM has reported that water inflow from the Birds Nest Aquifer into the lower decline was measured at 3 gallons per minute after the bulkhead was installed. Most of this water will have been dammed by the bulkhead and may have accumulated to the level of the Birds Nest Aquifer or higher in the decline. A portable, electric-powered, submersible, high-pressure centrifugal pump of a type typically used in underground mines, along with a discharge line that extends up the declines to the portal, will be used to remove the encountered water from the lower decline. The dewatering effort was described above under Stage 2.

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When the re-entry activity reaches the intersection between the upper and lower declines, a travel curtain, as shown in Figure 11B, will be installed in the upper decline just above the intersection with the travel way decline (also known as the B decline). A solid curtain or stopping, with a vent tube extending through it, will be installed in the lower decline just above its intersection with the travel way decline. An auxiliary intake fan of adequate size will be connected to the vent tube above the curtain or stopping and used to force fresh air from the ventilation shaft down the lower decline as the mining crew advances. The return air will move up the decline and through the travel-way to the base of the utility raise where it will be exhausted to the surface. The vent tubing, power line, communication line and the pump will be advanced as the mining crew progresses down the lower decline to the bulkhead. Figure 11B also shows the ventilation layout to be used during lower decline re-entry.

Stage 7: Bulkhead Removal

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As with all aspects of underground work, MSHA approval will be sought for this stage of work. The plans submitted to MSHA will address, among other items, 30 CFR 57.22103 regarding open flames at I-A, II-A, III, and V-A mines. They will be placed in Appendix D when they are available, as will copies of all related MSHA plans and approvals.

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The first step in bulkhead removal will be to core-drill a small (less than 4-inch diameter) hole through the bulkhead to test air quality below the bulkhead. The hole will be drilled through a packer to seal the drill-hole annulus and allow the drill rod and bit to be removed from the hole, and to seal the opening to prevent air below the bulkhead from being released into the working area. Water will be used during the drilling to provide for cuttings removal and to suppress spark generation. A sample tube will then be installed through the packer and bulkhead to measure air quality.

The bulkhead removal method that is ultimately selected will depend on the methane concentration below the bulkhead. Two methods are being considered. Under the first, drilling and blasting using permissible explosives will be used if the methane concentration is less than 0.5 percent. All blasting will be done with no workers in the mine. After blasting the bulkhead, the rebar will be removed by either torch cutting using appropriate hot work procedures, if the methane concentration is less than 0.5 percent, or by using portable hydraulic shears.

The second option will be employed if the methane concentration below the bulkhead is 0.5 percent or greater. Under this alternative, a hoe-ram concrete breaker will be used instead of drilling and blasting. A variance from MSHA to operate such a machine in the mine will be required. Adequate water sprays for dust control and spark suppression and ventilating air will be provided during the concrete breaking at the bulkhead. Air quality will be monitored continuously at the working face. Rebar removal will use the same methods.

Bulkhead rubble will be loaded and hauled from the mine using a rubber-tired load-haul-dump (LHD) unit. Rubble and rebar will be stockpiled on the surface near the portal, on previously disturbed ground, (see Figure 5A) until it is hauled to an off-site disposal facility (rebar) or used as backfill during reclamation (concrete rubble). Approximately 175 CY of rubble will be removed during bulkhead demolition.

Once the bulkhead is breeched, the utility raise will be temporarily capped, and the ventilation curtains and stopping at the intersection of the declines will be removed. Ventilation air will then move down the lower decline, through the mine workings, and be exhausted up the main shaft to the surface. Figure 11C shows the ventilation layout after the bulkhead has been breeched.

Stage 8: Re-entry Completion

Re-entry work will continue from the location of the former bulkhead to the bottom of the lower decline and through the rest of the mine workings using the same cautious air

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monitoring, roof and rib inspection, and remediation work. Special attention will be given to the integrity of the roof and the existing roof bolts, with any questionable areas being scaled and re-bolted. Power, ventilation, and communication systems will be extended into the mine workings as the work progresses.

106.2.2. Underground Mine Operations

Once the above-described preparatory steps have been completed, a new or used hoist, headframe, and man-cage will be installed as the first step in underground mine operations. These structures will be MSHA-approved. A hoist house will also be constructed to house the hoist, and it will be placed at the same location as the previous one (see Figures 4 and 5A). A concrete pad/foundation, approximately 40 feet by 25 feet, will be required at this location to provide an adequate foundation. The hoist system will serve as the second access and escape way for the mine.

Oil shale will be drilled, blasted, loaded onto LHD units and hauled to the surface with either the LHD units or low-profile haul trucks. Because of the limited tonnage that may be mined during Phase 2, mining will be confined to a ramp or ramps that include the entire 55-foot-thick ore horizon (Figure 12). Appropriate underground equipment will be used in the last open crosscut, including a two-boom drill jumbo, a bench drill, an explosives loading machine, a mechanical scaling machine, a roof-bolter, front-end loaders or LHDs, low-profile articulated haul trucks, crew transportation vehicles, auxiliary fans and ancillary equipment. All of this equipment will meet MSHA requirements for operation in a Category 1, Subcategory 1-A mine, or gassy underground oil shale mine. Further, as stated above in Section 106.2.1, all relevant MSHA regulations, requirements, and guidelines will be followed throughout these underground mine operations. This will require, among other items, the development and approval of a roof-control plan, which will be in place prior to mine development activities and prior to mining operations. OSEC, LLC understands that in addition to the required MSHA approval for this roof control plan, the BLM also wishes to have approval authority. As noted, MSHA plans and approvals will be appended to this NOI/POD in Appendix D as they become available.

Once at the surface, these LHDs or haul trucks will continue with the ore to the crusher site. The ore will be placed in one of six stockpiles located next to the crusher, prior to being fed to the crusher plant.

During Phase 2 RD&D, a total 3,000 tons of oil shale will be mined from the reopened mine. Of that quantity, approximately 2,000 tons are expected to be of a quality suitable for processing. (The expected unsuitable 1,000 tons of mine waste will be stockpiled along with the portal plug and bulkhead material removed from the mine, and later replaced in the mine as backfill during reclamation).

In part because this is an RD&D project, OSEC, LLC will be conducting intensive sampling of the raw shale throughout the Phase 2 operations. As shale is mined from the sample ramp, all material from the ramp will first be blended, and then sampled and

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Fischer assayed. (The particle size of the rock as mined does not lend itself to effective collection of a representative sample prior to the crushing and blending to be done on the entire ramp material, thus Fischer Assay samples will not be collected directly from the ramp.) Prior to the start of mining and retorting, OSEC, LLC will develop a detailed Sampling and Analysis Plan (SAP) (which will also address spent shale sampling) in order to characterize ore grade, kerogen content, etc. This plan will be submitted to DOGM and BLM (placed in Appendix C), and BLM will have approval authority over the plan. The plan will include such information as sampling frequency, test points, parameter lists, preferred EPA-certified laboratory to be used, etc. Further, results of the monitoring will also be submitted for placement in Appendix E as they become available. Last, if desired, OSEC, LLC will cooperate with these agencies should they choose to collect their own samples, obtain splits for independent analysis, etc.

106.2.3. Surface Operations

As derived from the acreage information provided in Table 1 above, almost all (94 percent) of the 76.4 acres of ground surface that would be used during Phase 2 RD&D has already been disturbed by previous operations. Only 6 percent represents disturbance of currently undisturbed ground.

Roads

Generally, existing roads will be used to access the site and conduct Phase 2 RD&D operations. As shown on Figure 3, some of these existing roads are located on the RD&D lease site; others are off-lease roads that will be used to access the RD&D site and the earthen retention dam. OSEC, LLC's use of off-lease roads will be as allowed under a right-of-way (UTU-85858) that has been issued to OSEC, LLC by the BLM. This right-of-way agreement is included in Appendix A, and covers 19,300 linear feet of roadway. As needed, and as allowed by the lease and right-of-way stipulations, existing on- and off-lease roads will be cleared of brush and debris, culverts will be replaced or repaired, and the road surfaces will be graveled and graded. Numerous culverts are already in place at the site, as shown on Figures 4, 5A, and 5B, at all locations where needed. Although original design details for these culverts have not been located, history indicates that they are generally sufficient for the expected flows. However, if site conditions indicate a need, an existing culvert may be replaced with a larger culvert than is currently in place. In no cases will culverts smaller than those that currently exist, be used as a replacement.

In addition, as shown on Figure 5A, two new short spur roads will be constructed for Phase 2 RD&D operations. One of these will be about 100 feet long and will be located entirely within already-disturbed ground. It will provide access to the partially retorted shale bin. The other will be about 350 feet long and will be located on currently undisturbed ground. It will provide access to the spent shale disposal area and its associated topsoil stockpile.

Structures and Facilities

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Several new structures and facilities (Figure 5A, including inset detail) will be built or installed during Phase 2 of the RD&D; most of these will be placed on already-disturbed ground. New structures include a crushing and screening plant (in an approximate 170-foot by 100-foot area), the pilot plant (retort plant site) with a 70-foot by 115-foot concrete foundation, a hoist building (with a 40-foot by 25-foot concrete foundation), a partially retorted shale bin, an explosives magazine, and the spent shale disposal area. The explosives magazine and the spent shale disposal facility (and its access road) are the only facilities that will be constructed on currently undisturbed ground. All support structures such as offices, laboratories, shops, warehouses, sleeping, restroom and shower facilities will be mobile, modular units located on existing disturbed ground. These modular buildings will be self contained, with sewage ultimately directed to the adjacent sewage tank for off-site disposal. The mine ventilation fan building will be re-commissioned and an intake ventilation fan installed (no exhausting fans are proposed). Since the existing hoist is not economically repairable, another hoist will be installed on a new foundation and housed in a newly-constructed hoist building, in the same location as the previous one.

During Phase 2, electrical power will be supplied by two diesel-powered generators. One of these will be located immediately south of the 16-foot ventilation shaft and will be used to support the underground mine reopening operations as described above. The other will be located on the southwest side of the retort plant site, and will be used to power lights and other ancillary equipment throughout the plant site. Electrical cable will be laid on the ground as shown on Figure 5A, to convey power from the generator at the shaft to the fan house and to the crusher site, and from the generator at the retort plant around the edge of plant site. Cable size and rating will be specified by taking into account the required power draw and the distance over which power will need to be distributed (to account for inherent losses in voltage with distance due to electrical resistance).

As noted above, OSEC, LLC will install two concrete pads, needed to provide adequate foundation support, during Phase 2 RD&D activities. One of these will be a 70-foot by 115-foot, 150 CY pad for the retort plant. The other will be a 40-foot by 25-foot (25 CY) pad for the hoist house.

Within the plant site, spill control will be managed locally near the tanks and other equipment. As noted, tanks will have secondary containment, via lining and berming, appropriately sized for capture. The retort itself has spill control ability for internal fluid spills or leaks. Last, OSEC, LLC will have on hand, and train employees in the use of, absorbents, booms, etc. that can be used to contain, control, or clean-up a spill. If needed, the culvert located to the northeast of the retort can be temporarily blocked to further impound a spill until clean up can occur.

Tanks

Several types of tanks will be brought into the site and used for storing various liquids, including hydrocarbons, raw process water, potable water, and wastewaters. These tanks are shown on Figure 5A and are addressed in Table 2 below. All tanks holding

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deleterious liquids will be secondarily contained, with sufficient capacity to hold (without overflow) 110 percent of the volume of the largest tank. Engineered design details for the secondary containment structures will be provided to BLM and DOGM prior to the start of operations.

In addition, tanks holding hydrocarbons will be subject to the requirements of a Spill Prevention, Control, and Countermeasures (SPCC) Plan. The SPCC Plan will be written to comply with applicable regulations at 40 CFR 112. Among other requirements, these regulations set forth requirements for secondary containment of stored oil products (i.e., 110 percent of the capacity of the largest tank). OSEC, LLC will design this secondary containment using a high density polyethylene (HDPE) geomembrane liner to prevent leakage. Because the tank truck loading area will involve the transfer of large quantities of hydrocarbons, OSEC, LLC's SPCC Plan will also address best management practices (BMPs) to prevent or manage releases from this area as well as from the tank farm. Included in the SPCC plan will be drawings and calculations that describe secondary containment. This Plan will be provided to DOGM and BLM upon completion, in Appendix F. Fuels tanks will include diesel and propane tanks (two 15,000-gallon diesel and two 1,000-gallon propane tanks). The shale oil products will be stored in on-site, heated tanks prior to being periodically shipped to end users. It is likely that there will be three 500-barrel tanks used for this purpose. One barrel equals 42 gallons, thus the total storage capacity of produced shale oil will be approximately 63,000 gallons.

Table 2 Tanks and Capacities

Material Contained	Tank Capacity	Number of Tanks
Diesel	15,000 gallons	2
Propane	1,000 gallons	2
Product Shale Oil	500 bbls	3
Potable Water	10,000 gallons	1
Water Supply	20,000 gallons	2
Process Wastewater	10,500 gallons	3
Sewage	10,000 gallons	1

Other tanks will hold potable water and process supply water, both of which will be purchased from off-site sources and hauled to the site. Potable water will be stored in a single 10,000-gallon tank located near the main camp and offices, and process water supply will be stored in two rectangular tanks located east of the retort, with capacities of 20,000 gallons each. Throughout Phase 2 RD&D, a total of as much as 840,000 gallons of water could be used for various stages of the operation, with the bulk of the water being used at the pilot plant for cooling spent shale (approximately 538,000 gallons), at the disposal site to aid in compaction (approximately 269,000 gallons) and at the crushing and screening plant for dust suppression (approximately 33,000 gallons).

Tanks will also be required to store various wastewaters until they can be appropriately disposed. Primarily, these will include the three 10,500-gallon tanks located immediately

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west of the retort. These three tanks combined provide a total storage capacity of 31,500 gallons, and will primarily be used to store plant site wastewaters, including the sour water described in Section 106.2.4 below. There is an on-site sewage treatment facility remaining from previous operations; however, it will not be used during Phase 2 RD&D. Instead, a 10,000-gallon sewage tank will also be used to collect raw sewage until it is periodically trucked off site by a licensed contractor to an approved sewage treatment facility. Wastewaters are described further in Section 106.2.5.

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Crusher Plant

Prior to being fed to the pilot plant for retorting, the oil shale must be crushed and screened. These feedstock tasks will be performed at the surface using a portable crushing and screening plant. This crushing and screening plant will be set up immediately southwest of the decline portal on an existing pad which will require only minimal grading to provide a level surface. This grading will be done simply by balancing the material pushed from the southeast side of the crusher site with it being distributed to the southwest side of the site (i.e., a balanced cut/fill). There will thus be no excess material to store or stockpile. The final surface will be compacted to provide a good working surface; a concrete pad will not be necessary.

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The crushing plant will consist of a primary jaw crusher, a secondary cone and/or double roll crusher, and appropriately sized screens to produce the minus ¾-inch feed required for the ATP retort. Various raw ore and sized material, including fines, will be stockpiled at the crusher site, as shown on Figure 5A. In order to minimize dust production, it is estimated that about 33,000 gallons of water will be needed at the crushing plant during Phase 2 activities. This water will be applied using standard water spray equipment, and will be trucked from the plant site to the crusher as needed. It will be obtained from one of the two process water supply tanks described above. The crushed oil shale will be stockpiled near the crusher, as shown on Figure 5A, and hauled by truck, as needed, to the 500-ton feed stockpile located next to the retort plant.

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Other Surface Infrastructure

Several existing structures or facilities, including the mine services building, the sewer plant, a microwave tower and building, the water treatment plant, among others, will not be used or occupied during Phase 2 RD&D operations. Figure 5A shows the areas and facilities that OSEC, LLC will reoccupy during Phase 2 RD&D, as well as the new structures.

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106.2.4. Retort Operations

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As noted above, OSEC, LLC plans to use an ATP plant that uses a proprietary thermal processing technology to recover oil from the oil shale. In September 2007, 300 tons of White River Shale were run through this plant in Calgary. For Phase 2 RD&D, a 4-TPH ATP pilot plant will be erected at the site and used to further test the viability of this system, which primarily pyrolizes the shale using a retort. Although this ATP process has been successful using oil sands and shales from other areas, and was effective during the 300-ton test mentioned above, its effectiveness with oil shale found in the

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White River area must be further demonstrated before a large-scale operation will be pursued. The ATP process is described below.

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The stockpiled, sized, and sorted oil shale feedstock will be loaded into the retort feed hopper using a front end loader. From there, the feedstock will be fed by a conveyor into the ATP processor (retort), which is a horizontal, rotary-kiln-type vessel with individual compartments or zones in which retorting and separation occurs. Figure 13 is a schematic of the ATP processor and Figure 14 is the system flow chart. The shale feed enters the pre-heat zone where the temperature of the shale is raised to about 450° F, driving off the free moisture in the form of steam. The steam is then condensed, and the water and any trace hydrocarbons are recovered in the steam condensation unit.

The heated oil shale passes into the reaction zone where the temperature is increased to about 900° F with hot spent shale providing the heat for retorting. The hydrocarbon vapors and off gas are vented to the oil recovery unit where the shale oil condenses and is sent to storage tanks. The off gas then passes through the sulfur recovery unit where the dust and acidic gasses are removed prior to being flared to the atmosphere. The water formed during retorting is condensed as sour water and is directed to one of the three 10,500-gallon process water tanks for off-site disposal at an approved facility.

The spent shale and contained coke are discharged into the combustion zone where air is added and the coked solids are burned, thus raising the temperature of the spent shale to about 1,300° F. A portion of the hot spent shale is recycled into the reaction zone to provide the heat necessary for retorting and the rest flows into the cooling zone. This secondary combustion step results in a more efficient process than some other retort systems, and also results in spent shales that are more likely to be environmentally benign.

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In part because this is an RD&D project, OSEC, LLC will be conducting intensive sampling of both the raw shale (as noted above) and the spent shale throughout the Phase 2 operations. The SAP will be submitted to DOGM and BLM (placed in Appendix C) before mining and retorting begins. The SAP will include such information as sampling frequency, sample location, parameter lists and associated laboratory standards, preferred EPA-certified laboratory to be used, quality assurance/quality control protocol, among other items. The plan will also address the determination of soil and subsoil characteristics of the ground surface upon which the spent shale will be placed, as described elsewhere. Further, results of the monitoring will also be submitted for placement in Appendix E of this NOI/POD. Last, if desired, OSEC, LLC will cooperate with these agencies should they choose to collect their own samples, obtain splits for independent analysis, etc.

In the cooling zone, the hot spent shale is cooled to about 650° F by indirect heat transfer through the inner wall of the retort to the incoming fresh feed in the pre-heat zone. The hydrocarbon-free spent shale can then be discharged from the processor for additional cooling and moisturizing before being hauled to the spent shale disposal pile. During this process, water is sprayed onto the shale to dampen and cool it at a rate

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such that there will be no free drainage of water through the shale. This water will be obtained directly from the water supply tanks located just east of the temporary storage area for these tailings materials, thus no additional ponds or tanks are needed. At the time of trucking to the spent shale pile, the temperature of the shale will be approximately 175° F. MWH (2007) states that, for each barrel of produced oil, two barrels of water are expected to be required to cool the spent shale. Using this ratio, it can be calculated that approximately 538,000 gallons of water could be used for cooling during Phase 2 RD&D (based upon a total of 6,400 barrels of produced oil). As described below (in Section 106.2.5), an additional amount of water will be needed for dust control and compaction during construction of the spent shale disposal facility.

During retort startup periods when hot solids are not available to provide heat for combustion, auxiliary propane-fired burners will be used. As needed, partially retorted shale will be stored temporarily in a bin located east of the plant (Figures 17A and17B). This bin will be used anytime there is an upset condition during retort startup or retort operation that results in the incomplete retorting of the oil shale feed. This material will subsequently be reprocessed in the retort to recover the remaining shale oil.

106.2.5. Waste Handling

Solid Wastes

Although approximately 3,000 tons of mined oil shale are expected to be removed from the mine, it is estimated that approximately 1,000 tons of this material will consist of mine waste not suitable for processing. This material will be stockpiled on previously disturbed ground along with the 4,750 CY of material removed from the mine during the reopening process, as described above in Section 106.2.1. During reclamation, as described in Section 110.2, most of this material will be replaced back in the mine as part of the required backfilling operation (except for the 250 CY of concrete rubble that will be hauled for off-site landfill disposal).

Cooled and moisturized spent shale will be hauled by truck to an engineered spent shale disposal area. In brief, the spent shale disposal pile has been designed to be a fully lined, 1.2-acre valley fill. By design, it will completely isolate the spent shale and minimize and contain any leachate. Ancillary features associated with the pile would increase the size associated with this facility to approximately 3.9 acres. Figures 15 and 16 show the configuration and cross sections for this facility. Prior to construction, the area underlying the facility will be sampled to determine background constituents including trace metals. After the topsoil is salvaged and stockpiled for later reuse, samples will be collected from the remaining substrate upon which the liner bed will be placed in order to provide documentation of their original condition. Details for this sampling will be included in the SAP for the raw and spent shale that was described above.

Because no site-specific information on the spent shale was available during the disposal pile design, MWH (2007) used data from the available literature and conducted modeling to predict the geochemical and geotechnical properties of the spent shale.

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Their analysis resulted in the design of a stable facility which produces only a small quantity of leachate. MWH (2008b) conducted further geotechnical and geochemical analyses based upon site-specific information obtained during Phase 1, and no design alterations were recommended for the Phase 2 spent shale disposal pile. As part of Phase I, samples of the spent shale as well as samples of artificially generated leachate (using Nevada's Meteoric Water Mobility Procedure) were tested for a wide array of heavy metals, volatile and semivolatile organic compounds, residual hydrocarbons, and several major cations. Sulfate, TDS, and fluoride were noted to be elevated in the leachate. However, based upon static acid-base accounting testing, the spent shale is not expected to be acid-generating, nor is it expected to be classified as hazardous, (based upon Toxicity Characteristic Leaching Procedure (TCLP) tests) (MWH 2008b). MWH (2008b) indicates that the geochemical results support the use of a liner and containment of leachate so that further investigations can take place during the Phase 2 RD&D, as planned.

While designed to be structurally stable and environmentally safe, the disposal pile will be used to provide data to confirm these conclusions and provide input to optimize the RD&D Phase 3 design. Thus, as required by the EA (BLM 2007), the spent shale disposal pile will be fully lined with an impermeable HDPE liner, and any leachate will be collected, measured, and analyzed. One goal of the research plan will be to demonstrate that a liner will not be necessary in Phase 3 RD&D or subsequent developments. MWH (2007) prepared a comprehensive report on the Phase 2 RD&D spent shale disposal pile design and the testing. It is incorporated by reference into this NOI/POD, and complete copies of the report have previously been submitted to DOGM and BLM.

A final SAP, based in part upon MWH's testing program, will be prepared and submitted to DOGM and BLM for placement in Appendix C. It will describe the details of the program to characterize leachate chemistry and quantity, infiltration characteristics of the compacted spent shale, geochemical characteristics of the spent shale, retort efficiencies, etc. This will include descriptions of collection procedures, sample frequency, laboratory certifications and methods, standards, quality assurance/quality control protocol, etc. In addition to the monitoring plan itself being submitted to these agencies, results of the monitoring will also be submitted for placement in Appendix E. Further, if desired, OSEC, LLC will cooperate with these agencies should they choose to collect their own samples or obtain splits for independent analysis. However, OSEC, LLC will only use laboratories that have the proper EPA certifications for the parameters being analyzed.

The spent shale disposal pile has been designed to be operated as two test plots to test different compaction characteristics. Full details are provided in the MWH report noted above (MWH 2007); however, in brief, one test plot will have three different layers (a one-foot surface layer of lightly compacted spent shale, overlaying a two-foot layer compacted to a dry density of 90-93 lbs/ft^3 at an approximate 22 percent moisture content, followed by homogenous spent shale compacted to a dry density of 90-93 lbs/ft^3 to the top of the sump). The other test plot will have a single homogenous layer

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of spent shale compacted to a dry density of 90-93 lbs/ft^3. Lysimeters will collect any leachate from the pile to enable chemical characterization and infiltration rate monitoring for each of the compaction scenarios. The impermeable liner and a leachate collection system will ensure that no leachate is released to the environment. Leachate will be collected in two small, lined collection sumps (one for each test plot), as described further in the MWH (2007) report. Figure 15 shows the storm water runoff collection pond associated with the spent shale disposal pile, but does not show the collection sumps. Figures in the MWH (2007) report show the sumps both in plan view and cross section.

During operations, the spent shale will be spread and compacted in individual 6-inch lifts to reduce infiltration and ponding. MWH (2007) states that, for each barrel of produced oil, one barrel of water is expected to be required during the disposal facility construction for dust suppression and compaction. Using this ratio, it can be calculated that approximately 269,000 gallons of water is expected to be used for these construction-related purposes during Phase 2 RD&D (based upon a total of 6,400 barrels of produced oil). This does not include the water for cooling purposes that was estimated above based upon a 2:1 ratio.

The surface of the pile will be graded as a shallow longitudinal dome sloping outward to prevent precipitation ponding on top of the pile and to provide separation between the two test plots. The pile will be surrounded by interceptor ditches, which will prevent upstream-area runoff from contacting the spent shale. These ditches were designed by MWH (2007) to have a triangular cross-section, with 3h:1v side slopes, and a 1-foot depth including freeboard. The ditches will be riprapped to provide stability. The ditches were designed to pass 4.2 cfs, calculated by MWH (2007) to be the peak flow generated by a 100-year, 24-hour precipitation event of 2.25 inches. They are shown in green on Figure 5A of this NOI/POD as a not-to-scale representation. Hydrologic design information, reproduced from MWH (2007), is included in Appendix G. The entire MWH report is incorporated by reference into this NOI/POD, and copies have been supplied to DOGM and BLM.

Liquid Wastes

Process wastewaters will be of two types: retort water (commonly known as sour water because of its poor water quality) resulting from the retort process; and connate water, (water trapped in the pore spaces of the rock), which is generally of better quality. The sour water will be stored in one of the three process water tanks and hauled for proper off-site disposal and/or recycled through the retort. Up to 48,000 gallons of this sour water could be generated during Phase 2 RD&D operations. The connate water will be stored in one of the two water supply tanks (i.e. mixed with fresh process water) and may be used to moisten spent shale, or spread on roads for dust suppression, depending upon its quality. Approximately 36,000 gallons of connate water is expected to be generated during Phase 2 RD&D. Both sources combined would result in about 84,000 gallons of process wastewater, all of which will either be recycled back through the retort, absorbed into the spent shale and evaporated, used for dust suppression (in the case of the good-quality connate water only) or stored in tanks for transport to a

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Should less than the design quantity of approximately 8,000 tons of spent shale need to be disposed in the facility (either due to less than the planned amount of processing, or to the fact that processing may occur in Alberta), the facility may be scaled back in size, and its design revised, with BLM and DOGM concurrence. In no case, however, would spent shale be disposed of on site during Phase 2 RD&D in an unlined facility.¶
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licensed, off-site disposal facility. Process water tanks will be within a secondary containment berm, designed to contain 110 percent of the capacity of the largest tank.

106.3. Estimated Acreages

The Phase 2 RD&D operations include disturbance of a portion of the 160-acre lease plus additional off-lease areas. OSEC, LLC will use or re-disturb a total of up to about 76.4 acres. The breakdown for this total project disturbance was given above in Table 1. The large majority (72.1 acres) of surface acreage affected by this project has already been disturbed by previous mining operations. About 47.7 acres of this total will be on previously disturbed ground within the 160-acre lease area, and about 24.4 acres will be within various previously disturbed off-lease right-of-ways associated with access roads, the impoundment associated with the earthen retention pond, and small areas contiguous to the west boundary of the lease. In addition, within the lease, a small amount of new disturbance (4.3 acres) will be required for the spent shale disposal pile and its ancillary features (about 3.9 acres) and for the explosives magazine area (about 0.4 acres).

106.4. Nature of the Materials to be Mined and Processed

Phase 2 RD&D activities include recovery, mining, and processing oil shale. Recovery includes excavating approximately 8,000 tons (out of a total of 50,000 tons) of previously mined oil shale that are currently stockpiled on site and will be processed. An additional 3,000 tons of oil shale will be newly mined from the reopened mine, and of that quantity, approximately 2,000 tons are expected to be of a quality suitable for processing. (The expected unsuitable 1,000 tons will be stockpiled along with the portal plug and bulkhead material removed from the mine, and later replaced in the mine.) At the end of Phase 2 RD&D, up to approximately 42,000 tons of oil shale from previous mining will still remain on site, although some or all of these oil shale resources may also be hauled away from the site for use by other entities, based upon the lease agreement.

The oil shale comes from the Mahogany oil shale zone of the Parachute Creek Member of the Green River Formation. This zone is approximately 100 feet thick (Figures 6, 7A, and 7B). The richest, most readily mineable part of the zone in the vicinity of the White River Mine is a 55-foot-thick horizon of high-grade oil shale. The top of this mining horizon is about 4 feet below a prominent volcanic tuff horizon known as the Mahogany Marker. This prominent parting plane is an excellent mine back. Oil shale within the 55-foot horizon includes layers that range in grade from 9 to 79 gallons-per-short ton (gpt), with the average grade being 29 gpt (Figure 8).

The total oil shale resource within the 55-foot mining horizon for the 160-acre RD&D Lease is approximately 25 million tons. The production rate for Phase 2 RD&D would vary as the research-driven testing progresses, but is expected to not exceed about 100

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tons per day. Mining operations would be scheduled for 5 days per week and one shift per day as new shale is required.

Production wastes for the entirety of Phase 2 RD&D include as much as 8,000 tons of spent shale.

106.5. Soil Characterization

Soils at the mine site have been mapped as Walknolls extremely channery sandy loam – Gilston association, 2-50 percent slopes (Table 3). Walknolls soils were formed from alluvium and colluvium and are found on slopes and tops of dissected plateaus and mesas. Gilston soils were formed from alluvium and are located in the bottoms of larger ephemeral drainages. Erosion hazard ranges from none to moderate. According to the BLM (2007), these soils are poor sources of topsoil because of rock fragments, sodium content (Gilston soils), shallow depth to bedrock (Walknoll soils), steep slopes, (Walknoll soils), carbonate content (Walknoll soils), and low organic matter (Gilston soils).

Table 3 Selected Soils Information

Soil Series	Ecological Site	Potential Native Vegetation	Sodium Absorption Ratio (SAR)	Annual Precipitation (inches)
Walknolls extremely channery sandy loam	Semi-desert Shallow Loam (Utah Juniper-Pinyon)	Black sage, saline wildrye, Mormon tea, bluebunch wheatgrass, galleta grass	10	8-12
Gilston	Semi-desert Gravelly Sandy Loam	Wyoming big sage, rubber rabbitbrush, spiny hopsage, Indian ricegrass, bluegrass, bottlebrush squirreltail, horsebrush, shadscale	55	8-12

Much of the area to be used by OSEC, LLC during Phase 2 RD&D operations has already been disturbed by previous mining activities. Topsoil was stripped from all of the previously disturbed areas and is stored in stockpiles located to the south, north, and northeast of the main shaft. Total volume stored is approximately 200,000 CY (BLM 2007). However, only about 19,400 CY of this amount is stored within the lease area.

While perhaps not ideal for reclamation, this stockpiled soil, as well as similar soil to be salvaged as part of Phase 2 RD&D operations, is expected to be adequate for reclamation.

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106.6. Topsoil Plan

The existing stockpiled soils will remain in their current locations until needed for reclamation. Because they are in a stable state with volunteer vegetative cover, they will not be re-disturbed until they are moved for reclamation.

There are two locations from which topsoil may need to be salvaged during Phase 2 RD&D operations: the areas associated with the spent shale disposal pile and its access road, and at the explosives magazine site. All other Phase 2 RD&D disturbance will occur within existing disturbed areas. Prior to stripping, vegetation will be cleared from the area to be salvaged.

The exact depth of topsoil to be stripped will be dependant upon quantity available, and will be determined in the field by a qualified specialist prior to stripping. Based upon current knowledge, it is expected that an average of 12 inches of suitable soil material can be salvaged per acre from the 3.9-acre spent shale disposal pile and access road area and from the 0.4-acre explosives magazine area. This topsoil will be salvaged as a single unit, as its thickness and makeup does not warrant segregation into differing horizons or layers. The topsoil will be stripped using a scraper fleet, dozer, or loader and stored in two piles: one near the spent shale disposal pile, and one near the explosives magazine, as shown on Figure 5A. These piles will be a maximum height of 12 feet, and remaining topsoil will be conveyed to the existing 19,400 CY topsoil pile and stockpile on the northern end of this pile as needed. The piles will be surrounded by small perimeter berms to protect them from run-on and to ensure that any eroded material remains at the bottom of the pile. The topsoil stockpiles will be protected by seeding with a fast-growing mixture, similar to the one shown in Table 4 below, depending upon BLM concurrence.

Table 4 Interim Seed Mix for New Topsoil Stockpile

Species	PLS lbs/ac
Indian ricegrass, Nezpar	2
Altai wild rye, Prairie Land	4
Western wheatgrass, Rosana	6
TOTAL	**12**

In order to provide information on the background chemical characteristics of the subsoil upon which the spent shale pile liner will be located, OSEC, LLC will collect and analyze samples from this area after the topsoil has been salvaged. This analysis will include the same parameter list as will be used to analyze the spent shale, as will be described in more detail in the SAP that will be prepared for the raw and spent shale sampling program previously discussed. Results will be made available to DOGM and BLM for placement in Appendix E.

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Upon reclamation, the stockpiled topsoil will be re-deposited evenly on areas disturbed or used by OSEC, LLC, as described in more detail in the reclamation plan (Section 110.5)

106.7. Description of Existing Vegetation Communities

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The surrounding topography ranges from approximately 4,950 feet to approximately 5,700 feet in elevation, with the majority of the surface disturbance at elevations between about 5,400 feet and 5,500 feet. Vegetation within the area includes barren lands previously disturbed by the White River Mine development activities, grass lands, sagebrush communities, and pinyon-juniper shrub lands. The mine shaft and main facilities areas are in the semi-desert Shallow Loam ecological site, with major species being Wyoming big sagebrush, black sagebrush and Salina wildrye.

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The Federal Prototype Project Final Baseline Report (VTN Colorado, Inc. ~1977) covering October 1974 to January 1977 for the original oil shale development includes vegetation data from four vegetation types within Tracts U-a and U-b, collected between 1974 and 1976. These communities are: sagebrush-greasewood, shadscale, juniper, and riparian vegetation types. Within each vegetation type, five areas were selected in which to sample plant species, density, cover, height, and litter cover. Primary productivity of big sagebrush was estimated in each area using the current year's growth. Soil temperature, moisture, salinity, and pH were also measured in each area. Raw data results, photocopies of vegetation maps, and data analysis are included in the Final Baseline Report (VTN Colorado, Inc. ~1977) in Section IV.

Although these vegetation surveys are dated, they provide useful baseline information with which to develop a reclamation standard, and an area-specific revegetation seed mix and cover standard. The vegetation cover surveys considered both ground cover, such as grasses or forbs, and overhanging canopy cover, such as larger shrubs or trees, at each measuring point. If there were 100 measuring points per transect, then, in effect, total vegetation cover could exceed 100 percent, since more than one vegetation type (canopy in addition to ground cover species) could occur at each data observation point. The 1974-76 data indicate that existing vegetation on the RD&D area (in the Juniper community) is <1 percent grass, 25.3 percent shrubs and trees, <1 percent forbs, and 8.3 percent litter. Bare ground was 83.7 percent, and vegetation was 16.3 percent. The 70 percent cover standard for reclamation success would convert to 11.4 percent total vegetation cover. Data for three of the four vegetation types (riparian vegetation was left out since it did not apply) are summarized below in Table 5.

The EA (BLM 2007) states that the seed mix should "reflect environmental conditions and ecological range sites emphasizing use of native species" and have the goals of "replacing suitable wildlife habitat and browse and providing a vegetative cover that stabilizes soils to control erosion and sedimentation." A seed mix is listed in Section 110.5.

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Table 5 Cover Data from 1974-1976 White River Mine Baseline Data*

Life Form	Fall 1974	Spring 1975	Spring 1976	AVERAGE
Juniper				
Grass	<1	T**	<1	<1
Shrub/Tree	12	18	46	25.3
Forb	T	T	T	T
Litter	12	5	8	8.3
Bare	85	80	86	83.7
Sagebrush- Greasewood				
Grass	T	4	3	2.3
Shrub/Tree	2	8	15	8.3
Forb	1	T	5	2
Litter	10	T	11	7
Bare	87	87	78	84
Shadscale				
Grass	T	4	T	1.3
Shrub/Tree	9	6	9	8
Forb	T	T	T	T
Litter	1	3	3	1.6
Bare	90	85	94	83.3

* From VTN Colorado, Inc. (~1977)

** Trace

According to the BLM's EA, there is no appropriate habitat for threatened or endangered plant species or BLM sensitive plant species within the 160-acre lease or associated off-lease road right-of-ways. The habitats that may contain listed or sensitive species are only relevant to Phase 3 RD&D activities, such as utility corridors.

106.8. Groundwater Depth, Overburden, and Geologic Information

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Groundwater Depth

The existing mine shaft and decline intercept the Birds Nest Aquifer, which, as the main aquifer above the oil shale-bearing rock, is a factor in mine planning. Based upon data collected at core hole X-13 at the White River Mine (Figure 7A), this aquifer is about 125 feet thick and is located between about 600 and 725 feet below ground surface. Assuming that the mine roof is at 1,026 feet below ground surface at this location (Figure 7B), the bottom of the Birds Nest Aquifer would be 300 feet above the mine at the core hole location.

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Recharge of the aquifer occurs by leakage from the overlying Uinta Formation and through infiltration to the aquifer where it outcrops at Evacuation Creek. Most of the mine site has artesian water pressure above the top of the Birds Nest Aquifer. Groundwater also occurs in the Douglas Creek Aquifer below the mining horizon. These aquifers are described in more detail in Section 109.1.

Extent of Overburden Material

The Mahogany Zone is approximately 100 feet thick and, at the mine site, begins about 1,000 feet below the ground surface (Figure 7A). Mining will occur in a 55-foot thick portion of the Mahogany Zone (Figure 7B). Because this operation is an existing underground mine that is already developed into the ore-bearing strata, there will be no overburden removed to access the ore.

Geologic Setting

The White River Mine is located in the Uinta Basin section of the Colorado Plateau physiographic province. The Uinta Basin is a structural depression, which is underlain by northwesterly dipping Tertiary strata. The region is characterized by a dissected plateau with strong relief. Elevation at the mine site ranges from 5,150 feet at the earthen retention dam to 5,694 feet at the top of the plateau on which the mine shafts are located.

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Utah's richest oil shale resources lie in the Uinta Basin, where 90 to 115 billion barrels of oil are contained in deposits with the potential to yield 25 or more gallons of oil per ton of ore (BLM 2007). In addition, other energy resources are also found in the area. The mine site is located due east of the Southam Canyon gas field drilled in Tertiary and Cretaceous formations. An existing oil lease within the Black Dragon Unit underlies this mine site. Other extractable energy sources in the vicinity of the site include tar sands and coal bed methane reserves. Gilsonite is also found to the north at Bonanza, Utah. Sand and gravel deposits are found in the White River valley though none are exploited today. There are no known commercial quantities of metal ores in the area.

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Surface materials found on the plateaus and steeper slopes in the vicinity of the White River Mine are primarily unconsolidated Quarternary collluvial deposits, consisting of large flattened rock slabs in an unsorted matrix of silt, sand, and gravel. The nearby White River and Evacuation Creek valley floors and several nearby ephemeral stream valleys are covered with Quarternary alluvium.

The Tertiary (Eocene) age Uinta Formation is located just below these Quarternary deposits and also the outcrops at several locations on the mine site. It is comprised of very fine-grained sandstone, siltstone, marlstone, a few lenses of pebble conglomerate, and a massive tuffaceous bed. The formation is approximately 440 feet thick at the shaft location and up to 800 feet thick in the surrounding area.

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The oil shale-bearing Green River Formation (also of Tertiary age) lies beneath the Uinta Formation. Its uppermost Parachute Creek Member contains the highest grade oil shale resource zone. The Parachute Creek Member consists mainly of oil shale, which is a marlstone that contains a solid hydrocarbon material known as kerogen. The oil shale is interbedded with minor amounts of siltstone, sandstone and altered volcanic tuff beds. The previously mentioned Mahogany Oil Shale Zone is within the Parachute Creek Member.

In the vicinity of the mine the Uinta and Green River formations dip to the northwest at about 1.7°. The major joint system trends N 65° W.

106.9. Ore and Waste Stockpiles, Spent Shale Disposal Pile, and Ponds

Ore Stockpiles

Currently there are about 50,000 tons (estimated) of oil shale stockpiled at the site from previous mining activities. Phase 2 RD&D will use up to approximately 8,000 tons of this rock (obtained from the southern-most of the two piles) to test the retort process while the mine is being re-opened. This stockpiled oil shale will also be available to other companies experimenting with oil shale processing methods at OSEC, LLC's cost of loading the shale into trucks. In addition, some quantity of newly mined ore could be temporarily stockpiled on the site. Oil shale to be used for processing in the ATP pilot plant (assuming that this plant is brought to the site) will be temporarily stockpiled either adjacent to the crushing and screening plant or, after it is crushed, adjacent to the ATP plant prior to being supplied to the feedstock hopper.

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Temporary ore stockpiles, with a combined footprint of less than 0.5 acres (included within the previously defined 76.4 acres of total disturbance), will be located within the ATP pilot plant area.

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Waste Stockpiles

During retorting, spent shale will be moistened to hasten cooling and control dust as it comes out of the ATP processor, and temporarily stockpiled near the ATP pilot plant. These temporary storage areas will cover a maximum of about 0.4 acres (included within the previously defined 76.4 acres of total disturbance), combined. After initial cooling, the material will be moved to the spent shale disposal area.

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Spent Shale Disposal Area

After being temporarily stockpiled near the ATP plant, the spent, cooled and moistened shale will be transported to a valley-fill disposal area located northeast of the ATP pilot plant area (Figures 5A and 15). Operation of the spent shale disposal pile was described above in Section 106.2.5. This disposal area including ancillary collection sumps, roads, etc. has been designed to be about 3.9 acres in size. The footprint of the pile itself will be approximately 1.2 acres at its maximum size. At the completion of Phase 2 RD&D, up to 8,000 tons of spent shale are expected to be located at this pile.

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The pile will be built with slopes no steeper than 3h:lv, and its final height will range from about 15-20 feet at its crest to ground level at the upslope end.

Any storm water runoff generated from precipitation falling on the spent shale will be collected in a lined 0.3 acre-foot capacity retention pond that will be constructed at the toe of the disposal pile. The calculated runoff resulting from a 100-year, 24-hour precipitation event (determined by MWH to be 2.25 inches) on the pile is 0.16 acre-feet (MWH 2007). Runoff from up gradient of the pile will be routed around it, in riprapped ditches as described in MWH (2007). Appendix G includes design information for the pond and diversion ditches, as taken from the MWH report. This report in total is incorporated by reference into this NOI/POD and complete copies have previously been supplied to DOGM and BLM. Any accumulated storm water runoff will be sampled to test water quality for future design consideration.

Earthen Retention Dam

An earthen retention dam (Figure 5B) was constructed in 1983 as part of previous oil shale development activities. Its clay core, cutoff trench, and grout curtain extend to competent bedrock and were designed to prevent underflow. In addition, a small seepage dam is located immediately downstream of the primary dam to collect seepage, if any occurs. The earthen retention dam is owned by the BLM, and is identified by the Utah Division of Water Rights as Dam No. UT00552. According to the State Engineers' webpage (Utah Division of Water Rights 2007), it was last inspected by that agency in 2004. Water Right 49-1224, held under the name of White River Shale Oil Corporation, was associated with this structure, but the water right lapsed in 1997.

The impoundment upstream of the earthen retention dam structure has a design capacity of at least 211 acre-feet (68,764,900 gallons). Information obtained from a stage/capacity table shown on an as-built drawing from the original design reports (Ralph M. Parsons Company 1982) indicates that the high water/overflow elevation equates to a 288-acre-feet capacity and the capacity at the dam crest is approximately 400 acre-feet. (As-built and design drawings have been scanned and are provided in the State Engineers online Dam Safety Database Information Viewer at http://nrwrt1.nr.state.ut.us/cgi-in/damview.exe?Modinfo=Viewdam&DAM_NUMBER=UT00552.)

The dam was designed to contain the 100-year, 24-hour precipitation event (determined by the designers to be 3.0 inches) from 850 acres of up-gradient watershed area, which includes the entire 160-acre lease area. Assuming the previously mentioned 211 acre-feet and these precipitation and acre values, it can be back-calculated that the designers conservatively assumed a 100-percent runoff (no infiltration) scenario to derive a 211 acre-feet capacity requirement. Obviously, this assumption vastly overestimates the actual runoff produced from this watershed, and thus allows the accommodation of a large volume of sediment storage and/or storage of non-storm waters such as pumped groundwater.

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The existing concrete-lined spillway would discharge excess runoff in the unlikely event that the reservoir's capacity was exceeded. This spillway was designed to discharge approximately 250 cfs, which represents an unknown flow return period. Appendix G provides some information collected by Golder Associates Inc. (2002). Their assessment indicates that that construction of the earthen retention dam and related structures was completed as designed. A 2006 visual inspection of this facility by JBR Environmental Consultants, Inc. indicates that the impoundment area only very rarely receives runoff, and when it does, runoff is minimal and not prolonged. Golder Associates Inc. (2002) also determined that there "was no evidence that significant volumes of pooled water had ever been contained by the dam embankment to extended time periods, nor was there evidence of significant sediment build up upstream of the embankment or soil contamination."

In late 2007, the BLM granted OSEC, LLC a right-of-way (No. UTU-85857) for the earthen retention dam, its associated pond site, and the existing drainage channel. The right-of-way gave OSEC, LLC the right to "construct, operate, maintain, and terminate these structures." Appendix A includes a complete copy of the right-of-way grant. The dam itself is approximately 650 feet long and 66 feet high. The existing drainage channel is a natural ephemeral channel that has likely been altered by previous mining activities at the site, and which only carries flow as a result of specific precipitation events or during snow melt runoff periods. The right-of way associated with the channel includes a width of 40 feet (20 feet on either side of channel centerline). The right-of-way allows use of these structures for storm runoff, snow melt, and/or water pumped from the underground mine assuming that the water meets applicable federal and state water quality standards. It does not require these structures to be reclaimed at the end of the lease term.

During Phase 2 RD&D operations, OSEC, LLC will use the earthen retention dam as the site's primary storm runoff and sediment control structure (from all disturbed areas with the exception of the spent shale disposal pile). As with the previous operations and as currently occurs, runoff from the site flows into the existing dry wash, which in turn flows to the area upstream of the earthen retention dam. Any storm water runoff that accumulates upstream of the dam will either evaporate or percolate into the ground surface in a relatively short period of time, the length of which will depend on the magnitude of the precipitation event. Leakage, if any, from the dam will be collected in the downstream seepage collection pond. OSEC, LLC will relocate a pump-back system at this pond and will use it to dewater the collection pond by re-circulating water back upstream of the earthen retention dam during Phase 2 RD&D operations.

The underground mine contains up to 18.3 million gallons of water that has accumulated over 20-plus years. Most of this water originated in the Birds Nest aquifer. The impoundment, and the associated dry wash, will also be used to collect pooled mine water from the initial stages of the mine re-opening, which will require dewatering of up to 18.3 million gallons. This water will not be discharged from the dam. OSEC, LLC will not be applying for an NPDES permit for this discharge in the belief that the

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wash may not constitute a jurisdictional water body which is subject to the federal Clean Water Act.

Based upon several factors, OSEC, LLC and ENVIRON believe that discharge of mine water will not have a material impact on water resources despite detected levels of TDS and low concentrations of two VOCs. First, the flow rate will be controlled to minimize additional erosion of the dry wash. Second, the dam (and the backup seepage collection basin) prevent any discharged mine water from reaching the White River. Infiltration within the impoundment area is reportedly low, and according to calculations made during the design of the dam, seepage rates of less than 1,000 gallons per year are expected. During the evaporation process, the residual low levels of VOCs are expected to either volatilize or photo-degrade. Further, the underlying Birds Nest Aquifer is several hundred feet below the surface at this location. Therefore, the likelihood that whatever minimal seepage that does occur actually reaches groundwater is very low. During mine dewatering, samples of the water contained upstream of the dam will be tested to ensure that the TDS results do not materially differ from the earlier mine water sample results and that the VOCs levels are not consequential.

As the consultant to OSEC, LLC responsible for state permitting activities related to this project, JBR is investigating the need to obtain approvals from the Utah Division of Water Quality's Groundwater Protection Section. Initial indications are that the use of the earthen retention dam to hold intercepted groundwater will cause, at most, a *de minimus* impact to groundwater quality, and thus the activity can be considered as permitted-by-rule. Previous approvals from the BLM and others to use the dam to impound wastewaters during the WRSP support this initial assessment. Information prepared to request a permit-by-rule determination will be included in this NOI/POD in Appendix G once it is available.

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106.10. Quantity of Material to be Mined or Moved

Oil Shale

As described above, OSEC, LLC expects to use as much as 8,000 tons of previously mined oil shale for testing of the ATP pilot plant. This oil shale is currently stockpiled at the site, and remains from previous mining operations. It will be hauled from the stockpile to the feedstock crushing and screening plant, prior to being moved to the retort plant. OSEC, LLC also plans to mine fresh oil shale in order to test the plant with fresh ore. The expectation is that the processing of approximately 2,000 tons of fresh shale will require mining approximately 3,000 tons of material. (The 1,000-ton difference is due to the inevitable incorporation of some waste materials from the mining horizon that are not suitable for processing.) The combination of previously mined oil shale and newly mined oil shale that will be used during Phase 2 RD&D will be approximately 10,000 tons. Newly mined oil shale will be temporarily stockpiled on the surface before being crushed and processed. An unknown quantity of the previously mined oil shale could also be moved off site for use by other entities, as required by the lease terms.

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Spent shale
The total quantity of spent shale generated during Phase 2 RD&D is estimated to be as much as 8,000 tons.

Topsoil
During previous operations by others, topsoil was stripped from all disturbed areas associated with the White River Mine, including off-lease access roads. This resulted in over 200,000 CY (BLM 2007) of topsoil that was stockpiled in surface piles to the south, north, and northeast of the main shaft, where they currently remain. Approximately 19,400 CY of this amount is currently stored within the 160-acre lease and will be available for use in Phase 2 reclamation.

Topsoil will be stripped and stockpiled from 4.3 acres of newly disturbed areas (i.e., the spent shale disposal area, its access road, and the explosives magazine site). It is assumed that an average of 12 inches per acre will be salvaged. This will result in up to approximately 6,940 CY of topsoil from these locations.

During reclamation, topsoil will be re-spread at a similar depth to pre-mine conditions prior to seeding, as described further in Section 110.5.

Other material
Because the White River Mine has already been developed, there will be only limited need for surface grading or excavation.

Approximately 250 CY of concrete rubble would be produced in re-opening the 16-foot shaft, 5-foot utility raise, and in removing the bulkhead located in the lower leg of the decline (175 CY from the bulkhead and 75 CY from the other two structures). Further, the decline portal is currently plugged with approximately 4,500 CY of earth and rock. All of this material (a total of approximately 4,750 CY) will be temporarily stored on site, in a stockpile adjacent to the decline as shown on Figure 5A. The concrete rubble will then be hauled off site for disposal, and earth and rock will eventually be used in reclamation to backfill the mine openings as described in the reclamation section of this NOI/POD. Associated rebar and other metals collected during demolition of caps and plugs will be trucked off site to a licensed disposal and/or recycling facility.

R647-4-107. Operator Practices

As required by R647-4-107, OSEC, LLC will conform to the operator practices described below.

107.1. Public Safety and Welfare

The White River Mine had been classified as gassy by MSHA because of two methane ignitions during the previous development work. (Due to a change in MSHA regulations

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at 30 CFR part 57, Subpart T, it has been reclassified as a Category 1, Subcategory 1-A mine.) Later there were two explosions in the mine, one in 1995 while a contractor was attempting to cap the 30-foot diameter main shaft during mine closure and a later one that was probably caused by lightning. Specific precautions to prevent further methane explosions will be essential during OSEC, LLC's operations, in order to provide for both employee and public safety. Some of these were described above in Section 106.2. As stated in Section 106.2.1, OSEC, LLC will operate under all applicable MSHA regulations, requirements, and guidelines throughout all Phase 2 RD&D operations. Further, the main shaft, which serves as the mine exhaust shaft, will be equipped with a continuous methane monitoring device at the surface to log the methane levels into a computer and to provide an alarm if the methane concentration in the exhaust air reaches one percent.

As also described in Section 106.2.1, OSEC, LLC will develop a detailed HS&E plan for all activities occurring for the life of the project. The plan will include emergency response procedures for the site and for the mine, and will be provided to DOGM and BLM for placement in Appendix D.

Currently, the ventilation shaft and the main shaft are enclosed within 6-foot-high chain-link fences that are topped with three stands of barbed wire. These will remain in place until mine re-opening necessitates their removal and additional access constraints are in place. Other fences will not be necessary during Phase 2 RD&D operations, because public access will be limited and controlled.

OSEC, LLC will further minimize hazards to public safety and welfare during operations. This will include such measures as:

- installing locked gates at the two road access points to the mine and processing area;
- storing all trash, scrap metal, wood and extraneous debris at a designated location prior to being routinely hauled off site to the County landfill; and
- posting warning signs (which will include blasting protocols) at the two road access points.

Measures to prevent or control fire include the following:

- Debris will not be allowed to collect on site and will be regularly hauled away to a disposal facility;
- Fuels will be properly stored and handled, under the SPCC plan;
- The two large water supply tanks (shown in detail 1 on Figure 5A) will be available on site for use as a water supply in an emergency situation; and

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- All appropriate MSHA safety measures would be enforced, to prevent surface and underground fires.

107.2. Natural Drainage Protection

There are no perennial streams within the lease area. The nearest is the White River, which is located approximately one mile north of the decline portal and about one stream-mile northwest of the existing earthen retention dam. This earthen retention dam structure, as described in Section 106.9 above, was constructed to fully contain the 100-year, 24-hour precipitation event from the mine site and additional contributing watershed areas.

The existing disturbed area (and OSEC, LLC's operation) sits on either side of a small dry wash that can convey runoff to the earthen retention dam. Storm water runoff generated on disturbed land is generally faster and more erosive than it is on the land prior to the disturbance. The natural channel through the site, down to the earthen retention dam, has previously been subject to these potentially increased flows. In addition, an existing road travels along this drainage. It is probable that this drainage was re-routed to some degree for the road, and that sediment from it enters this drainage during precipitation events. However, OSEC, LLC will be implementing erosion and sediment controls on site and along roadways, as needed, to minimize impacts to the wash. As noted in Section 106.9, for more than a 25-year period, there has been no evidence of significant accumulated sediments upstream of the earthen retention dam, providing direct evidence of the past stability of these natural channels and their ability to convey runoff from the disturbed area without causing excessive erosion.

Intercepted groundwater will be released at a velocity that does not erode the channel. Any problem areas will be identified through inspection and appropriate measures taken to stabilize the channel and prevent reoccurrence. As noted in Section 106.2.1, the water will be conveyed to the wash via two short (approximately 300 feet long) pipelines, as shown on Figure 5A. These lines will be flexible plastic pipe with a diameter of between six and eight inches. Their outlets will be placed at the edge of the wash, and flows from these pipes would be controlled to a velocity that does not erode the drainage bed or side slopes. The natural drainage is located, as shown on Figure 5A, east of road that leads from the plant site to the southernmost oil shale stockpile and west of the 30-foot shaft and decline portal pads. Blue arrows on Figure 5A indicate the natural flow path and show that this drainage continues north and then west around the north of the southernmost oil shale stockpile. It then continues to the large earthen retention dam (see Figures 3 and 5B for this alignment). Parts of the channel coincide with a former roadway, which is no longer functional or drivable. Along the short segment of roadway/drainage channels between the two oil shale stockpiles, riprap will be placed as necessary to provide for erosion protection and

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protection of the road locally so as to maintain access to the southernmost oil shale stockpile.

The spent shale pile, which was described in detail in Sections 106.2.5 and 106.9, will be designed and operated to fully isolate spent shale and precipitation falling upon it. Therefore, the small ephemeral watershed in which the spent shale disposal pile will be located (as well as the White River) will remain protected from this material.

Should any process wastewater be accidentally released, pumps will be deployed to retrieve as much of this water as possible. As required, appropriate agencies (including BLM and EPA) will be notified, and follow-up investigations and remediation will take place with those agencies' concurrence.

Similarly, spills of any hydrocarbons will be contained and cleaned up, as specified in OSEC, LLC's SPCC Plan. The SPCC Plan will address all requirements of applicable regulations at 40 CFR 112, and will be included in Appendix F. Among other requirements, these regulations set forth requirements for secondary containment of stored oil products (i.e., 110 percent of the capacity of the largest tank); specify clean up practices and reporting requirements; and address BMPs to prevent or manage releases. OSEC, LLC will use HDPE geomembrane liner material within the secondary containment to prevent leakage. Depending upon the quantity of the spill, appropriate notifications will be made to one or more agencies (for example BLM, EPA, National Response Center, Utah Division of Water Quality, and/or Utah Division of Environmental Response and Remediation), as specified in the SPCC Plan. In addition, both process wastewater tanks and fuel tanks will be located within secondary containment. As a final check, the earthen retention dam will also serve as emergency containment for any spilled wastewaters or other liquids that might be inadvertently released from the site, including the spent shale disposal pile. As such, the White River will be adequately protected from direct or indirect impacts associated with OSEC, LLC's Phase 2 RD&D project.

Numerous culverts are already in place at the site, as shown on Figures 4, 5A, and 5B, at all locations where needed. Although original design details for these culverts have not been located, history indicates that they are generally sufficient for the expected flows. However, if site conditions indicate a need, an existing culvert may be replaced with a larger culvert than is currently in place; however, in no case will culverts smaller than those currently existing be used as a replacement. During operations, OSEC, LLC will maintain all culverts, cleaning them of sediments and organic debris as needed to ensure their capacities. While erosion, head-cutting, scour, or other evidence of excessive velocities at culvert outlets is lacking, OSEC, LLC would repair and prevent such occurrences if they occur during Phase 2 operations.

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The Federal Clean Water Act requires that an NPDES Permit be obtained for the discharge of pollutants to a "water of the United States". If the groundwater intercepted in the mine includes pollutants and OSEC, LLC elects to discharge such water to the dry wash (and assuming the EPA determines the wash to be a "water of the United States"), then OSEC, LLC will obtain an NPDES Permit for such discharges. This permit would need to be issued by the EPA due to the location of the lease site within Indian regulatory jurisdiction. OSEC, LLC anticipates that such a permit will establish pollutants discharge limitations, and possibly flow limits, in order to protect water quality downstream of the discharge. If an NPDES Permit is obtained, it should adequately protect water quality. If EPA determines that an NPDES Permit is not required, OSEC, LLC will not discharge intercepted groundwater to the wash unless it meets the state water quality parameters that would have been applicable were the site not on Indian jurisdictional land. If the intercepted groundwater does not meet such limits, OSEC, LLC will either haul such water for off-site disposal or will treat it on the site prior to discharge. ¶

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107.3. Erosion Control

Construction

The majority of the earth work needed for OSEC, LLC's Phase 2 RD&D operations has already been done as part of the prior development of the White River Mine. OSEC, LLC's site layout takes advantage of these surface facilities to the extent possible, thus only minimal regrading will need to be done at the site. Using previously graded areas minimizes erosion potential by minimizing the overall disturbance footprint at the site. Storm water runoff conveyances are already in place over most of the site and are currently stable. As noted above, for more than a 25-year period, there has been no evidence of significant accumulated sediments upstream of the earthen retention dam, providing direct evidence of the past stability of these natural channels and their ability to convey runoff from the disturbed area without causing excessive erosion. Thus these drainages will not be modified for these Phase 2 operations. Similarly, as noted above, culverts are in place and will be kept functional and operable such that a pattern of downstream erosion is not initiated.

For the minimal construction that will need to be done, contractors will be required to use properly installed silt fences, coir rolls, or similar structures as needed to control runoff and erosion, and to minimize impacts to the ephemeral washes that drain the site. These structures will be industry standard, using similar materials, installation techniques, and maintenance protocols as specified in DOGM's reclamation guide (DOGM 2008). In any event, the existing large earthen retention dam will receive any runoff and prevent off-site sedimentation.

Operations

Newly created topsoil stockpiles will be protected by seeding with a fast-growing grass mixture as prescribed above to reduce erosion. Further, they will be surrounded by small perimeter berms to ensure that any eroded material will remain at the bottom of the pile. Existing topsoil stockpiles appear adequately protected against erosion in their current condition.

A storm water management plan will be prepared and implemented at the site. It will be similar in nature and scope as would be required for a Multi-sector General Permit for Storm Water Associated with Industrial Activities. This plan will contain BMPs that will minimize erosion from roads, facilities pads, stockpiles, and other Phase 2 RD&D disturbances. It will be placed in Appendix F of this NOI/POD, when available. Further, routine inspections and maintenance of any water control or sediment control structures including culverts, silt fences, and/or coir rolls will ensure their effectiveness and prevent erosion problems that could be associated with their failure.

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107.4. Deleterious or Acid-forming Materials

All tanks, including those containing shale oil product, fuel, solvents, lubricants, or wastewater, will be located within lined, bermed containment areas. An SPCC Plan will be prepared and followed for all tanks that contain hydrocarbons. As noted previously, this plan will address all of the requirements of 40 CFR 112, including secondary containment, inspections, spill prevention, etc. A copy of this plan will be placed in Appendix F of this NOI/POD when available. Should a spill occur, as required, emergency response measures will be taken to control and contain the spill, appropriate agencies will be notified as described above in Section 107.2, and remediation will take place in accordance with those agencies' direction. All of these liquids, as well as any other produced waste or other products, not currently anticipated to be present, would be kept contained, confined, and eventually hauled off site for proper disposal.

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Sulfur and nitrogen are generated as a result of the retort and upgrading processes, which can include hydrotreating. During Phase 2 RD&D, upgrading will not occur, so essentially all of the generated sulfur and nitrogen will be retained within the shale oil product, with the exception of minimal amounts that would be a component of air emissions, assuming that the ATP plant is used at the White River Mine site.

As described above in Section 106.2.5, the spent shale disposal pile is not expected to be acid-forming. Its chemical characteristics, as well as the chemical characteristics of leachate through the pile, will be thoroughly analyzed during both Phases 1 and 2 of OSEC, LLC's RD&D operations. Meanwhile, by design, this material will remain isolated from the environment so that deleterious constituents, if any, such as volatile organics, trace metals, or remaining hydrocarbons which may be present, are not released.

As noted above, a SAP will be prepared and submitted to DOGM and BLM for placement in Appendix C of this NOI/POD. It will describe the details of the program to characterize leachate chemistry and quantity, infiltration characteristics of the compacted spent shale, geochemical characteristics of the spent shale, retort efficiencies, etc. In addition to the SAP itself being submitted to these agencies, results of the monitoring will also be submitted in quarterly reports prepared by OSEC, LLC. Further, if desired, OSEC, LLC will cooperate with these agencies should they choose to collect their own samples, obtain splits for independent analysis, etc. However, OSEC, LLC will only use EPA-certified laboratories for the specific parameters of analysis. In order to obtain background information on the soils underlying the spent shale disposal pile, OSEC, LLC will obtain samples of the salvaged topsoil and of the subsoil upon which the pile will be constructed.

107.5. Soils

As described above in Section 106.6, topsoil will be handled so as to be protected and available for reclamation. This includes avoiding re-disturbance of existing stockpiles

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that remain from previous operations. Newly salvaged topsoil will be seeded with an interim grass mix, and protected from run-on or erosion loss by a small perimeter berm.

107.6. Concurrent Reclamation

Given the short timeframe of Phase 2 RD&D activities (up to 14 months) concurrent reclamation is not likely to be practical. However, any areas that are disturbed by OSEC, LLC that are not routinely or currently used will be kept in a safe, environmentally stable condition. Noxious weeds on the Uintah County and State of Utah Noxious Weeds lists will be monitored for, and aggressively treated, if present on these disturbed sites, as required by the BLM (2007).

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R647-4-108. Hole Plugging Requirements

All exploration holes that were drilled during previous development were plugged with BLM oversight. OSEC, LLC drilled a hole in June 2008, which was approved by BLM and DOGM. This hole was completed as a groundwater monitoring well. As required by those approvals, this well will be properly plugged when no longer needed. No other drill holes are planned during Phase 2 RD&D operations.

R647-4-109. Impact Assessment

This section describes resources that have the potential to be impacted, the types of impacts that could occur, and the means by which impacts will be prevented, minimized or mitigated. It has been written to include the full scope of all Phase 2 RD&D operations described above.

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109.1. Surface and Groundwater Systems

Surface Water

The lease area is located in the lower part of the 5,100 square-mile White River Basin (HUC 14050007), less than a mile from the river corridor. Annual rainfall averages 8-12 inches per year. With average base flows of about 420 cubic feet per second (cfs) and average spring runoff flows of about 1,300 cfs (BLM 2007), the White River is one of the main tributaries to the Green River. Their confluence is located just south of Ouray, Utah about 20 miles west of the lease area. The Green River is part of the Colorado River system.

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Located on a generally north sloping plateau dissected by numerous ephemeral drainages, the lease area does not contain any perennial surface water sources. The

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nearest live stream is the White River itself. There are no known springs in or near the lease area. The ephemeral drainages that cross the area are typical of those found in this high-desert environment. Channels are incised in some reaches and essentially undefined in others, riparian vegetation is lacking, and bed/bank sediment movement is evident. The runoff regime of these channels is controlled primarily by local summer thunderstorms that generate infrequent and short-lived, but often intense, flash floods.

Previous activities associated with oil shale mine development at this site have modified local natural surface drainage patterns. As part of this past development, a large earthen retention dam with a design impounding capacity of 211 acre-feet (68,764,900 gallons) was constructed across an ephemeral wash to capture all runoff and sediment from the disturbed areas and the up-gradient catchment. The impoundment was designed to contain runoff from a 100-year, 24-hour storm event of 3.0 inches. There is little sign of significant flows reaching the dam in recent years. Additional information on the hydrologic design of this dam is contained in Section 106.9 and in Appendix G.

Groundwater

Groundwater underlies the lease area at depth. Previous underground workings intercepted the Birds Nest Aquifer about 620 feet below ground surface. In fact, as part of OSEC LLC's initial mine reopening under the current project, dewatering of up to 2.3 million gallons of groundwater trapped above the concrete bulkhead in the lower decline will be required. The Birds Nest Aquifer is located within the Parachute Creek Member of the Green River Formation. The bottom of the overlying Uinta Formation generally serves as a confining bed for the Birds Nest Aquifer (BLM 2007). The Birds Nest Aquifer appears to average about 125 feet thick in the vicinity of the lease area. Its areal extent has been estimated at about 300 square miles (Dynamac Corporation 2002). Gradient is to the northwest at about 250 feet/mile.

Water bearing zones are also found in the lower Uinta Formation, (above the Birds Nest), and the Douglas Creek Member of the Green River Formation (below the Birds Nest). Stratigraphically, the mineable oil shale is located between the Birds Nest and Douglas Creek aquifers. Uinta Formation groundwater was encountered during the original shaft development for the project, though in much smaller quantities than the Birds Nest Aquifer.

Near the White River Mine site, but off of the lease, shallow ground water is present in the unconsolidated alluvial aquifer associated with the White River. Dynamac Corporation (2002) estimated the average alluvial aquifer thickness at about 30 feet. Connection between the artesian Birds Nest Aquifer and the White River alluvial aquifer occurs through upward leakage, at an estimated rate of about 30 acre-feet/year (BLM 2007). The Birds Nest and lower Uinta Formation aquifers are also connected through both upward and downward leakage. Further, in certain reaches along the White River, discharge from the alluvial aquifer to the underlying Uinta Formation also occurs. The Birds Nest and Douglas Creek aquifers are considered to have a negligible connection.

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Surface and Groundwater Quality

According to the EA that was prepared for the OSEC, LLC project (BLM 2007), total dissolved solids (TDS) were measured in the White River between 1974 and 1984, and were found to be inversely related to flow. This is a typical pattern in the region, where snow melt serves to dilute higher TDS base flows. During that same time period, total suspended sediment (TSS) concentrations for the White River were found to vary over several orders of magnitude, but in general, increasing in concentration with increasing flow – again typical for streams in this region.

State-designated beneficial uses for the White River and its tributaries are 2B (secondary contact recreation), 3B (warm water fish and aquatic life), and 4 (agriculture). The latest 305(b) report to Congress (Utah Division of Water Quality 2006) finds that the White River fully supports its designated 3B and 4 beneficial uses (2B was not assessed), and thus its water quality is not considered to be impaired.

Dynamac Corporation (2002) discussed the water quality of area groundwater. Baseline data from the 1970s was compared with data collected in the mid-1980s (during previous mine development at this site) as well as data collected in 2001. Their analysis states that water from the Birds Nest Aquifer is not potable or suitable for stock watering or irrigation. TDS averaged about 4,100 mg/l in the up-gradient wells, decreasing to about 2,275 in down-gradient wells due to the addition of Uinta Formation groundwater. Further, they noted that iron and manganese commonly exceeded water quality standards. Although the 1985 data showed elevated levels of some parameters in some wells, this was not replicated during the 2001 sampling.

As part of the Stage 1 mine characterization described above in Section 106.2.1, OSEC LLC contracted with MWH to collect two water samples from the 30-foot mine shaft. The sample results, obtained in late spring 2008, indicated a TDS of about 6,530 mg/l (MWH 2008a). (The White River, with its Class 4 agriculture beneficial use, has a TDS standard of 1,200 mg/l.) Unlike the previous sampling, neither iron nor manganese were elevated, although MWH noted that total chromium, reported at 0.18 mg/l in both samples, exceeded the Class 3B (aquatic) criterion. MWH also noted that tetrachloroethene and trichloroethene were present in both samples: 30 and 35 mg/l for the former, and 76 and 85 mg/l for the latter. These data are included in Appendix E, and were discussed previously above.

Water Rights

According to the Utah State Engineer's Office online database (accessed in November 2007), there are no surface or ground water (including wells) rights in Sections 22 or 27 of Township 10 S, Range 24 E. The previously held water right for the sediment retention pond lapsed in 1997.

Potential Impacts to Water Resources:

While minor sediment loading and/or erosional forces may occur due to storm water runoff or mine de-watering in the ephemeral channel that bisects the mine, these impacts should be minimal. Staged release of the pooled mine water at a rate that

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Adherence to *NPDES Permits (storm* water permits for construction and for operations, and wastewater permit for intercepted groundwater) will minimize impacts to surface water due to erosion and/or sedimentation, and will ensure that water quality standards are met.

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produces a non-erosive velocity will also be done to ensure that the ephemeral wash is not impacted. Because all water will be contained by the retention dam, there will be no impacts to the White River.

Fuel, oil, process water or sewage effluent could accidentally spill, causing a release of this material to the environment. Operational features such as secondary containment will reduce this potential, and the earthen retention dam will provide an additional measure of protection to the White River. Further, BMPs such as regular equipment maintenance and standard operating procedures for servicing vehicles, the processing retort, and other mechanical systems will minimize the chance of spills. To the extent possible, handling and transfer of waste oils and sludges will take place in areas with secondary containment.

The spent shale disposal area will be isolated from upstream runoff through the use of perimeter diversions. Compaction of individual spent shale lifts will minimize infiltration of precipitation through the spent shale, and allow for maximum evaporation and the lifts will be graded and sloped to prevent ponding on the pile surface. Any infiltration, entrained water, or surface runoff from the spent shale disposal pile will be prevented from entering surface waters by direction to the down-stream pond, the leak collection system, and the liner. This capture and collection system will also prevent this water from entering groundwater. These structures and their design considerations are described fully in the MWH (2007) design report, incorporated by reference into this NOI/POD, and previously supplied to DOGM and BLM. Summary design information is included in Appendix G of this NOI/POD and described briefly in Sections 106.2.5 and 106.9 above.

In addition, the BLM (2007) has required that OSEC, LLC submit and comply with a water quality monitoring plan, which will further ensure that any water quality impacts are identified and subsequently eliminated or mitigated. This monitoring plan will address all of the commitments made during the EA process, and will be prepared and submitted to the BLM for approval prior to construction of any Phase 2 RD&D facilities. Further, it will be placed in Appendix C of this NOI/POD, when available.

109.2. Wildlife Habitat and Endangered Species

As part of the EA for all three phases of OSEC, LLC's project (BLM 2007), several categories of wildlife were considered in regard to the potential for the project to impact them or their habitat. These categories included: threatened/endangered wildlife species as identified by the U.S. Fish and Wildlife Service (USFWS); sensitive species as identified by either the BLM or the State of Utah; other species managed by the Utah Division of Wildlife Resources (DWR); and migratory birds as defined by the Migratory Bird Treaty Act. Based upon BLM expertise and habitat field surveys conducted within the 160-acre lease area and other rights-of-way, the EA noted those species that have the potential to occur within OSEC, LLC's project area and thus require detailed analysis and possible clearance surveys.

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According to this information, the threatened/endangered wildlife species that required detailed analysis were the bald eagle and four species of native fish. (Subsequent to EA analysis, the USFWS de-listed the bald eagle, but bald eagles remain protected by the federal Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.) This species is discussed below.

Potential impacts to the fish are essentially restricted to water depletions. The subject of water depletion from the Colorado River Basin due to surface water or ground water withdrawals associated with OSEC, LLC's project (Phases 1, 2, and 3) was addressed in BLM's EA (2007). That document indicates that Phase 3 would result in a depletion that would cause it to be subject to a one-time contribution to the 1987 Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program). Phases 1 and 2 were not considered to cause a depletion in a quantity sufficient to require such a contribution. Thus the four listed species of native fish are not addressed further in this document.

Sensitive species that were carried forward for detailed analysis are the ferruginous hawk and the Townsend's big-eared bat. The three species managed by the Utah DWR that were noted as requiring detailed analysis are the pronghorn antelope, mule deer, and mourning dove. Although numerous species of migratory birds use the area for nesting and roosting, only the bald eagle and ferruginous hawk are discussed in this document.

Habitat characteristics and ecological concerns of the species noted above are discussed briefly below.

Bald eagles are no longer a threatened species, but are still protected by the acts noted above. They typically nest in large trees, primarily cottonwoods and conifers, although they have also been known to nest on projections or ledges on cliff faces. They prefer areas within a few miles of perennial water, such as the White River. Although no bald eagle nests have been found, it is possible that they may nest in the area of the White River Mine. Nest surveys were conducted in 2006 and will need to be repeated prior to construction, as described at the end of this section.

Ferruginous hawks have been identified by the BLM as a sensitive species that prefers open grasslands and shrub steppe areas. Their habitat includes sagebrush and greasewood-saltbush shrublands, often on the periphery of pinyon-juniper habitat. Ferruginous hawks typically nest on the ground or in lone trees, far from human activity. Potential impacts to ferruginous hawks include temporary displacement during construction and prior to successful reclamation. Raptor surveys will need to be conducted prior to construction, as described at the end of this section.

Townsend's big-eared bats are also a BLM-defined sensitive species. They commonly hibernate in relatively cold and well-ventilated locations, such as are located within mine entrances. Their maternity and hibernation colonies are typically found in caves and mine tunnel entrances, and potential habitat exists within the Project Area. While bat

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surveys are not required prior to construction, if bats are discovered, the BLM will require specific measures, as described at the end of this section.

Pronghorn antelope are managed by DWR, and prefer grasslands, sagebrush plains, deserts, and foothills. Suitable year-long habitat exists within the area. Potential impacts include long-term displacement by construction and mining activities prior to successful reclamation. No specific project-related stipulations were considered necessary for this species as a result of the EA's impact analysis.

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Mule deer are another large game species managed by DWR. These animals prefer coniferous forests, desert shrub, chaparral and grasslands with shrubs. They are often associated with successional vegetation. Suitable year-long habitat and winter range exists within the area. Potential impacts include long-term displacement by construction and mining activities prior to successful reclamation. Timing limits will be implemented in some of this area, as described at this end of this section.

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Mourning doves are one of the upland game birds managed by DWR. They prefer open woodlands, forest edges, cultivated lands with scattered trees and bushes, and desert country near water. They usually nest in trees or shrubs. Mourning doves were observed in upland areas near the White River and Evacuation Creek. However, no individuals were observed during field surveys conducted as part of the EA process. Potential impacts include long-term displacement by construction and mining activities prior to successful reclamation. However, the project should have minimal impact on these animals because there is abundant similar habitat adjacent to the lease area, and no specific stipulations were imposed by the BLM.

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In order to minimize the potential to impact several of these species, OSEC, LLC committed to the following stipulations that relate to Phase 2 RD&D, as part of the EA process:

- Pre-construction clearance surveys will be conducted in the spring prior to construction to identify bald eagle nests located within one mile of the project site, and in winter to identify active bald eagle roosts within 0.5 miles of the project site. Construction activities will not occur within 0.5 miles of any active bald eagle nest from January 1 to August 31 and within 0.5 miles of any active roosting sites from November 1 to March 31.

- Surveys will be conducted each spring to identify active raptor nests within 0.5 miles of active construction areas. Construction activities will not occur within 0.5 miles of active raptor nests between January 1 and August 15, or until fledging and dispersal of young.

- If bats are found in the mine, one-way doors will be installed at the mine shaft entrances that allow bats to safely leave, but not re-enter the mine shafts.

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Because there will be no open process water ponds associated with Phase 2 RD&D, fences will not be necessary to protect wildlife species.

The incremental loss of habitat associated with Phase 2 RD&D new disturbances is not considered to be significant. Further, it will be temporary as reclamation of this new disturbance, as well as reclamation of other currently disturbed areas used during Phase 2 RD&D, will reestablish those areas as suitable habitat.

109.3. Soil and Plant Resources

Much of the mining area was disturbed previously and soils have already been salvaged. Topsoil on areas slated for new disturbance will be salvaged as well. Soils at the mine site are channery sandy loam and, though chemically suitable, are of limited productivity due to rock fragments, shallow depth to bedrock, steep slopes, some areas of high sodium or carbonate content, and low organic matter. More details on area soils and vegetation are provided in Sections 106.6 and 106.7, above.

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During Phase 2 RD&D, impacts to soil and plant resources will be minimal due to the small amount (4.3 acres) of new ground disturbance that is planned. Topsoil will be salvaged and the piles will be seeded to prevent loss. During reclamation, soil and vegetation will be reestablished on the new disturbance as well as areas used during Phase 2 RD&D that are currently disturbed. Reclamation practices such as using native and adapted seed in an approved seed mix, and using proper seed bed preparation and seeding practices will help to ensure that reclamation is successful at re-establishing viable soil and plant resources.

Although an accidental release of fuels, produced oil, waste water or other liquids could contact soil or plant resources, this potential is very low given the secondary containment of those liquids. Further, any such release will be rapidly controlled and mitigated.

Noxious weeds may invade disturbed lands; however, the BLM (2007) has required OSEC, LLC to commit to controlling those species. In part, noxious weed introduction will be reduced by using weed-free seed during reclamation, surveying for species prior to disturbance, controlling and eradicating invasive species, etc., as will be described in the noxious weeds management plan that OSEC, LLC will prepare and submit to the BLM.

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109.4. Slope Stability, Erosion Control, Air Quality, Public Health & Safety

Slope Stability

The operation is an underground mine, and further, one that has already been developed. Thus there will be no exposed highwalls or other large excavations that could present stability concerns. All new work pads and materials storage areas,

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including the expansion of the processing facilities pad, will be constructed on flat to slightly sloping topography, and will not create unstable slopes.

In addition, with the exception of the spent shale disposal pile, there will not be a need to create large amounts of additional fill. That pile has been engineered to ensure stability (MWH 2007). At its final configuration, it could be 15-20 feet high with sideslopes that are a maximum of 3h:1v. The complete design report for the spent shale disposal pile has been submitted to DOGM and BLM, and is incorporated by reference into this NOI/POD.

Erosion Control

Erosion control is discussed above in Section 107.3.

Air Quality

OSEC, LLC has been in discussions with EPA Region 8 about air permitting requirements for the Phase 2 RD&D project. Consistent with Title V regulations that require submissions of a Title V permit application within 12 months of beginning commercial operation, EPA has indicated that a Title V air permit will not be required for Phase 2 if the duration of retort operations is less than 12 months. OSEC, LLC commits to operate the ATP retort in Phase 2 RD&D so as not to emit more than 100 tons in any 12 month period of any air pollutant regulated by the Clean Air Act.

In the absence of an EPA minor source preconstruction permitting program in the jurisdiction of the lease area, OSEC, LLC will install emission control devices on the ATP system during Phase 2, consistent with the EA (BLM 2007), including air pollution control devices for sulfur dioxide (SO2), carbon monoxide (CO), and particulate matter (PM) achieving a 95% removal efficiency. All emissions will be limited to and maintained at minor source thresholds.

Further, OSEC, LLC will commit to several additional measures to ensure that air quality is protected. Fugitive particulate dust will be controlled in several ways. Dust inhibitors will be used on road surfaces as needed, and speed limits will be established and enforced to minimize traffic-produced dust. Water trucks and/or sprayers will be used as needed during topsoil salvage and construction, and water sprayers will be used as needed at the crushing and screening plant, stockpiles, and work areas. The erosion control measures described above will also inhibit particulate dust.

All vehicles, and earth- and shale-moving equipment will be properly maintained to maximize performance and minimize fuel combustion and particulate emissions.

As demonstrated in the Environmental Assessment (BLM 2007), emissions from Phase 2 result in ambient air quality impacts of less than 2% of the applicable National Ambient Air Quality Standards.

The mine openings will be expected to produce methane gas emissions. The main shaft, which serves as the mine exhaust shaft, will be equipped with a continuous

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methane monitoring device at the surface to log the methane levels into a computer and to provide an alarm if the methane concentration in the exhaust air reaches one percent. Additionally, as required by MSHA, methane concentration will also dictate various actions depending upon concentrations, including evacuation of personnel as specified. These action levels and subsequent required actions will be specified in the ventilation plan that will be submitted to, and approved by, MSHA.

During Phase 2 RD&D operations, surface air quality monitoring stations may be installed as necessary to support future Phase 3 RD&D air quality permits. These would be used to establish baseline conditions and monitor surface air quality during retort operations. EPA Region 8 has stated orally that existing meteorological data are sufficient for air quality modeling for Phase 3. However, if required, prior to operations, an air monitoring plan will be prepared by OSEC, LLC and submitted to the BLM and DOGM for placement in Appendix C; BLM will have approval authority for this plan.

Public Health and Safety

The site will be maintained in a clean and safe condition at all times.

Explosives will be used underground within the mine as allowed by MSHA (whose regulations, requirements, and guidelines will be followed throughout all of the Phase 2 mining activities). Blasting signs will be posted at appropriate locations. All explosives will be stored as required by state and federal regulations to prevent unauthorized use.

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Public health and safety will also be maintained by gating the two access road entries, and placing warning signs at these gates.

Further, OSEC, LLC's HS&E plan (copies of which will be provided to DOGM and BLM for placement in Appendix D) will address emergency response procedures that will ensure both employee and public safety.

After the conclusion of Phase 2 RD&D activities, and prior to either the initiation of reclamation activities or Phase 3 RD&D development, OSEC, LLC will maintain the site in an orderly and clean condition. All storm water, pollution control and monitoring devices will be maintained in working order. Further, all roads and facilities will be maintained in working order. The site will be secured to prevent unauthorized activity: road gates will remain locked, portal doors will be kept closed, and all shafts will be fenced with locked gates.

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R647-4-110. Reclamation Plan

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110.1. Current and Post Mining Land Use

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This section is predicated upon the assumption that Phase 3 RD&D will not occur. Further, the reclamation discussions and surety calculations are based upon the assumption that the full scope of Phase 2 RD&D disturbances and activities has been conducted.

The area has been used historically for mining and exploration, as well as for livestock grazing and wildlife habitat. Based upon nearby cultural sites (BLM 2007), it was also used by pre-historic cultures. Once Phase 2 operations are completed and the site has been reclaimed, the post-mining land use will be a combination of livestock grazing, wildlife habitat, and continued maintenance of the site for potential mine development. While the establishment of continued mine development potential as a post mining land use is not typical, the nature of this site warrants this. First, based upon the lease agreement between OSEC, LLC and the BLM, OSEC, LLC believes it will be responsible for reclaiming only those areas of the larger White River Mine site which it uses, occupies, or disturbs. Second, the presence of already mined oil shale and usable surface infrastructure would make the site conducive to another type of RD&D project by other entities should OSEC, LLC relinquish the RD&D lease. Both the historical context of the site and the future viability of oil shale development warrant something less than a full return to livestock and wildlife uses.

110.2. Reclamation of Roads, Slopes, and Structures

During reclamation, as described below, and summarized in Table 6, OSEC, LLC will reclaim 42.4 acres of ground.

Table 6 Reclamation Acres Summary

	Acres Reclaimed	Acres Left Unreclaimed
Previously Disturbed Acreage Reoccupied by OSEC, LLC	38.1	34.0
Acreage Newly Disturbed By OSEC, LLC	4.3	0.0
Total	42.4	34.0

Reclamation activities will include closure of the underground mine; demolition and removal of all surface facilities constructed or used in conjunction with the RD&D project, with certain exceptions noted below; and reclamation and revegetation of most areas disturbed by the project operations. The existing earthen retention dam will remain functional and unreclaimed, and responsibility for it will revert to the BLM. The existing stockpiles of previously mined oil shale will remain unreclaimed (consistent with the terms of the right-of-way). As discussed further below, most roads (both on- and

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off-lease) will be left in a maintained and usable condition and responsibility for them will revert to the BLM. Other surfaces, as shown on Figure 18 and Table 7 below, will be reclaimed. As shown, only a small portion of the reclaimed area will be regraded (as shown on Figures 18 and 19) before undergoing surface preparation (ripping), topsoil placement, and seeding. The remainder (shown in on Figure 18) will not be regraded, but will have surface preparation (ripping), topsoil placement, and seeding. Certain details of the reclamation treatments at the spent shale disposal pile are specific to the nature of that test facility; those are described in the MWH (2007) design report, which has been supplied to BLM and DOGM and is made part of this NOI/POD by reference.

Table 7 Reclamation Treatments Summary

	Acres
Total Area Regraded	1.7
Total Area Ripped	40.7
Total Area Topsoiled	42.4
Total Area Seeded	42.4

As stated above, OSEC, LLC believes that any structures, facilities, or disturbed areas that remain from prior mine operations and that have not been reoccupied or used by OSEC, LLC during Phase 2 RD&D operations will not be reclaimed by OSEC, LLC. All applicable state and federal permit requirements will be followed during the reclamation process.

Underground Mine and Portal Areas

All machinery, equipment, supplies, piping and wiring will be removed from the underground mine and hauled off site for re-use or proper disposal. The surface support facilities such as the hoist and hoist house, headframe, ventilation fan and other ancillary mining equipment and structures constructed as part of the Phase 2 RD&D project will also be dismantled and removed from the site.

It is assumed that a reinforced concrete bulkhead will be installed in the lower decline below the Birds Nest Aquifer prior to backfilling the main shaft, the ventilation shaft, and the utility raise. These three shafts, as well as the decline portal (outside the outer air door) will be backfilled up to the ground surface prior to being covered with soil and revegetated. This backfill will require about 29,500 CY. The material will from come from several sources: (1) approximately 4,500 CY of earth and rock removed from the mine during the reopening process; (2) approximately 1,000 tons (estimated at approximately 350 CY) of mine waste that will be removed from the mine during Phase 2 but not suitable to be processed; and (3) approximately 24,650 CY of additional waste material that was removed during initial mine development in the 1980s and is currently comprising a fill west of the 30-foot shaft.

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Surface Facilities

All Phase 2 RD&D project-related structures, ancillary facilities, water pipelines, and above-ground utilities (including electrical cables and generators) will be dismantled as necessary and removed from the site. All resultant demolition debris, including trash, will be taken away from the site to a licensed disposal facility. All concrete foundations and equipment pads either constructed or used by OSEC, LLC will be demolished and the rubble will be hauled to an off-site landfill. This includes approximately 175 CY of broken up concrete from the ATP plant pad and the utility raise pad; it also includes the 250 CY of concrete rubble that was removed from the mine during reopening tasks.

All tanks, containers, etc. associated with the processing system, including chemicals or other hazardous materials, wastes, or other materials they contain, will be removed from the site to a licensed disposal or recycling facility. Hydrocarbon tanks will also be removed and any residues will be disposed of in an approved off-site facility.

As needed, to improve root penetration, compacted areas will be ripped to a depth of approximately 12 inches using a tractor-pulled ripper or similar equipment prior to topsoil application.

Slopes

In general, site topography will not be substantially altered after Phase 2 RD&D operations. Most surfaces, including most slopes and pads, will remain in their current configuration and will not be regraded during reclamation. In particular, the crusher site and the retort site will not be regraded, but will be left in an essentially flat configuration. Regrading will be done over 1.7 acres in the vicinity of the shaft disposal pile, where in-mine waste material had been placed during previous operations. Approximately 24,650 CY of this material will be used to backfill the mine during Phase 2 RD&D reclamation activities. After this material is removed, the surface will be left in a generally uniform, 2h:1v slope. Figures 18 and 19 show this area, and Figure 19 includes cross section details.

Roads

Figure 18 shows which roads (both on- and off-lease) will be reclaimed and which will remain. As noted above, most roads will be left in a maintained and usable condition and responsibility for them will revert to the BLM (consistent with the terms of the lease and the rights-of-way). This means that any imported gravel surfacing or dust inhibitors will be left in place. Culverts and other drainage features will be left in place and functional. The two main access gates will also remain in place and locked, with BLM having full control over their use. These roads all provide access to areas of the site for which access will need to remain (i.e., the earthen retention dam, the electrical building, the mine services building, the water treatment plant, and the previously mined oil shale stockpiles).

For roads that will be reclaimed, this will entail ripping, topsoiling, and seeding according to the methods discussed in Section 110.6.

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Drainages

The ephemeral drainage that bisects the portal and processing areas will remain in its current alignment. During reclamation activities, it will be protected from sedimentation using temporary sediment control structures such as coir rolls or silt fences in areas where regrading will have the potential to contribute sediments to this area.

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Ponds

The existing earthen retention dam will remain and responsibility for it will revert to the BLM.

The 0.3-acre-foot storm water detention pond associated with the spent shale disposal pile will be reclaimed by removing its liner and backfilling to approximate original contour. Backfill materials will be come from the originally excavated materials which were used to construct the pond's berms. The backfill will be moderately compacted prior to topsoil placement and reseeding. Should the BLM prefer that the retention pond be left functional, OSEC, LLC will do so, however the surety includes full reclamation as described here.

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110.3. Surface Facilities to Remain

After Phase 2 is complete, the surface facilities that will remain will be those that were in existence prior to OSEC LLC's operation, but which OSEC, LLC did not use. These will include the mine services building, the sewer plant, the water treatment plant, the microwave tower and associated building, and the northernmost existing oil shale stockpile. These are shown on Figure 5A as unoccupied during Phase 2. In addition, the earthen retention dam will also remain in a functional, un-reclaimed state. Last, the southernmost oil shale stockpile will remain unreclaimed. OSEC, LLC will have removed approximately 8,000 tons of this material during Phase 2 operations, and perhaps may have removed additional quantities for use by others, but it will be left in an accessible and usable configuration for others. As noted above, roads leading to these surface facilities that will remain will also be left functional and unreclaimed.

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As described above, constructed pads and fill slopes would also remain, but would be revegetated.

110.4. Treatment, Location and Disposition of Deleterious Materials

All remaining shale oil, fuels, liquid wastes, and poor quality produced water from oil shale retorting will be transported off site for sale or for disposal at a licensed facility.

At the completion of Phase 2 RD&D, there could be up to 42,000 tons of previously mined shale left stockpiled on site (less if OSEC, LLC has provided oil shale to other entities for their own testing, as required under the lease agreement). This material will be left in place to remain available for other users.

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The spent shale pile will be the other large waste feature left on site. Final plans for this disposal area will depend on information collected during operations regarding the presence/absence of any deleterious leachate from the pile, and the quality of any water coming off of, or out from under, the pile. It is expected and assumed that the as-built pile configuration, with no slopes steeper than 3h:1v, will generally remain, and will be a sufficient surface upon which to place topsoil. However, the above-ground piping and the vault associated with the leachate collection system will be removed from the site. In addition, the on-pile storm water runoff channels will be backfilled and compacted so that they will no longer direct runoff to the small storm water retention pond, which will be reclaimed and no longer function. The external interceptor ditches will remain so as to continue to keep runoff away from the pile. Should the BLM prefer that the retention pond and internal ditches be left functional, OSEC, LLC will do so; however, the surety includes full reclamation as described here.

Other than the spent shale and any remaining stockpiled oil shale ore, there will be very little fill or waste material left on the surface after Phase 2 RD&D. Rock and backfill removed from the portal and declines at the start of Phase 2 RD&D will be reused during closure as described above. It will be temporarily stockpiled near the areas from which it is removed, as shown on Figure 5A.

110.5. Topsoil Redistribution and Revegetation

Topsoil Replacement and Seedbed Preparation

Currently, 19,400 CY yards of topsoil is stockpiled within the lease area and available for reclamation. In addition, approximately 6,940 CY will be salvaged from areas newly disturbed during Phase 2 RD&D. This will result in approximately 26,340 CY of on-lease topsoil available for use after Phase 2 RD&D is completed. This quantity would only allow for a replaced topsoil depth of approximately 4.7 inches, which is considered insufficient for proper reclamation. Thus, in order to obtain a uniform 12 inches of topsoil over the 42.4 acres requiring topsoil (see Figure 18), an additional 42,100 CY of topsoil will be obtained from the nearby off-lease topsoil storage pile. The use of this topsoil will require additional approvals from BLM, which will be sought well before Phase 2 RD&D reclamation begins. A total of 68,440 CY of topsoil will be used from these three sources (6,940 + 19,400 + 42,100 = 68,440 CY).

During reclamation, the topsoil will be replaced on most areas that were previously disturbed and re-used by OSEC, LLC. As noted above, only minimal grading will be done at the site. The ground surface will be prepared for topsoiling by ripping it to a depth of 12 inches. Most roads, as well as the remaining stockpiled raw shale and the earthen retention dam and associated pond area would not be reclaimed (they will remain available for other users).

At the spent shale disposal area, the access road for the spent shale disposal area, and the explosives magazine, approximately 6,940 CY (12-inch depth over 4.3 acres) of topsoil will be stockpiled and protected from erosion until Phase 2 RD&D is completed.

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Deleted: Assuming an average replacement depth of 12 inches over an area of approximately 50 acres, approximately 81,000 CY of this currently stockpiled soil will be used. The remainder will be left in place for any subsequent reclamation of the areas not used by OSEC, LLC.
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Based upon an initial assessment of expected characteristics of the compacted spent shale, MWH (2007) has recommended a 1-foot-thick topsoil cover be placed atop the spent shale prior to revegetation.

Because the BLM (2007) has noted that area soils are somewhat unsuitable for reclamation due to a number of factors including high sodium and carbonate, a representative sample will be collected from topsoil salvaged from the spent shale disposal area, and one from an existing topsoil stockpile and analyzed for fertility. Based upon the results, amendments could be used to enhance the topsoil's chemical suitability to the extent possible.

Once replaced on the areas slated for topsoiling, as shown on Figure 18, topsoil will be pocked with a backhoe or trackhoe bucket to create small basins and provide a roughened surface to retain seed and moisture, and to enable root penetration. On the spent shale disposal pile, topsoil will be lightly scarified to provide a roughened surface without disturbing the compacted spent shale material. Equipment used for topsoil placement and preparation is likely to include a dozer and/or scraper.

Seed Mixture

A single seed mix shown below in Table 8 is proposed for all reclaimed surfaces. The mixture will be certified weed-free. Seed tags will be retained, and copies of them provided to BLM and DOGM within 30 days of the seed being placed.

Seeding Method

The seed mix will be broadcast-seeded on the areas designated in Figure 19. Revegetation work, including both seedbed preparation and seed application, will take place in the late fall season. Seed will be spread as soon as possible following seedbed preparation.

Table 8 Reclamation Treatments Summary

Quantity (lbs PLS/acre)	Seed Type
1	big sagebrush
0.5	winterfat
2	four-winged saltbush
3	crested wheatgrass
3	bluebunch wheatgrass
4	needle & thread grass
3	intermediate wheatgrass
1	small burnet
0.5	blue flax
18	**TOTAL**

Other Revegetation Procedures

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Seeding Method¶

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The seed mix will be broadcast-seeded on all areas affected by mining, processing, transportation, and staging. Revegetation work, including both seedbed preparation and seed application, will take place in the late fall season. Seed will be spread as soon as possible following seedbed preparation.¶

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An invasive, non-native weed management plan, conforming to the requirements of the BLM and local weed management agencies, will be adopted and followed for the project. This plan will be provided to DOGM and BLM for placement in Appendix F.

Reclamation will be deemed successful when total vegetation cover is at least 11.4 percent, based upon data shown in Section 106.7, and DOGM approval.

R647-4-111. Reclamation Practices

This section is not required; instead, all required descriptions and commitments for reclamation are contained in the reclamation plan section above, which addresses R647-4-110 requirements.

R647-4-112. Variance

The mine operator is not requesting any variances from Rule R647-4-107, 108, or 111.

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R647-4-113. Surety

The surety is given in Appendix H. It is based upon the assumption that Phase 3 RD&D operations will not occur, that the full scope of activities and disturbances occurred, and that full reclamation to provide for the postmining land uses of livestock grazing and wildlife habitat will occur.

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Golder Associates Inc. December 2002. Final Report White River Oil Shale Mine Site Reclamation Project Uintah County, Utah. Volume II of III. Conceptual Design Report for Runoff Retention Dam Reclamation (Utah Dam Number UT0052).

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MWH 2008b. Letter Report dated May 5, 2008. Summary of Mine Water Sampling, RD&D Program, White River Oil Shale Mine, submitted to Sage Geotech, Inc.

MWH 2007. Research, Development and Demonstration Program, White River Oil Shale Mine, Spent Shale Pile, Phase 2 Permitting. Prepared for Oil Shale Exploration Company and Sage Geotech, Inc. July 2007.

Ralph M. Parsons Company. November 1982. Runoff Retention Dam Design Report, White River Shale Project, Tracts Ua and Ub. Job Number 6205-1700.

Utah Division of Water Quality. 2006. Utah's 2006 305(b) Water Quality Assessment Report to Congress.

Utah Division of Water Rights. 2007. Website access in September 2007, at: http://nrwrt1.nr.state.ut.us/cgi-bin/damview.exe?Modinfo=Viewdam&DAM_NUMBER=UT00552

VTN Colorado, Inc. ~1977 (exact date not known). Federal Prototype Project Final Baseline Report Prepared for the White River Shale Project.

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Prior to the conclusion of Phase 2 RD&D activities, OSEC, LLC will determine whether to proceed to Phase 3 RD&D development. If further development is to occur, final designs and approvals could take up to one year after Phase 2 RD&D is complete. During that interim, the OSEC, LLC will maintain the site in an orderly and clean condition in preparation for Phase 3 RD&D activities. All storm water, pollution control and monitoring devices will be maintained in working order. Further, all roads and facilities will be maintained in working order. During the period between RD&D Phases 2 and 3, the site will be secured to prevent unauthorized activity: road gates will remain locked, portal doors will be kept closed, and all shafts will be fenced with locked gates.

The following reclamation discussions and surety calculations are based upon the assumption that Phase 3 RD&D is not viable, thus the site will be left in a condition suitable for livestock and wildlife uses. It also assumes that the full scope of Phase 2 RD&D disturbances and activities were conducted (i.e., the ATP plant was brought to the site and used for processing.)

The final reclaimed configuration, should OSEC, LLC cease activities and terminate the lease after Phase 2 RD&D, will depend somewhat on BLM's future plans for the site. Further, it is important to note that, based upon the lease agreement between OSEC, LLC and the BLM, OSEC, LLC believes it will be responsible for reclaiming only those areas of the larger White River Mine site which it uses, occupies, or disturbs.

Appendix A
Lease and Rights-of-Way Agreements

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU of LAND MANAGEMENT

UTU- 84087

OIL SHALE RESEARCH, DEVELOPMENT AND DEMONSTRATION (R,D&D) LEASE

Part 1. Lease Rights Granted

This lease is entered into on June 21, 2007 to be effective on July 1, 2007 by the UNITED STATES OF AMERICA (the ''Lessor''), acting through the Bureau of Land Management (hereinafter called the ''Bureau''), of the Department of the Interior (the ''Department''), and

Oil Shale Exploration Company, L.L.C..
3601 Spring Hill Business Park
Suite 201
Mobile, Alabama 36608

(the ''Lessee''), pursuant and subject to the provisions of the Mineral Leasing Act of February 25, 1920 as amended (30 U.S.C. 181–287), hereinafter called the ''Act'', more specifically section 21 of the Act (30 U.S.C. 241), and to the terms, conditions, and requirements (1) of all applicable regulations promulgated by the Secretary of the Interior (the ''Secretary'' including revisions thereof hereafter promulgated by the Secretary (and not inconsistent with any specific provisions of this lease), all of which shall be, upon their effective date, incorporated in and, by reference, made a part of this lease for mining operations. To the extent the provisions of this lease are inconsistent with the requirements of any regulation or order, the lease terms govern.

Part 2. Terms and Conditions

Section 1. Definitions

As used in this lease:
(a) ''Authorized Officer'' means any employee of the Bureau of Land Management delegated the authority to perform the duty described in the section in which the term is used.
(b) ''Commercial Quantities'' means production of shale oil quantities in accordance with the approved Plan of Development for the proposed project through the research, development and demonstration activities conducted on the lease, based on and at the conclusion of which a reasonable expectation exists that the expanded operation would provide a positive return after all costs of production have been met, including the amortized costs of the capital investment.

(c) ''Leased Lands'' means the lands described as follows:

T. 10 S., R. 24 E., SLM, Utah.
Sec. 22, E½SE¼SE¼SW¼, NE¼NE¼SE¼, S½ NE¼SE¼, S½ NW¼SE¼, SW¼SE¼, W½SE¼SE¼;
Sec. 27, NW¼NE¼, E½NE¼NE¼NW¼.

Containing 160.00 acres, more or less.

(d) ''Oil shale'' means a fine-grained sedimentary rock containing: (1) organic matter which was derived chiefly from aquatic organisms or waxy spores or pollen grains, which is only slightly soluble in ordinary petroleum solvents, and of which a large proportion is distillable into synthetic petroleum, and (2) inorganic matter, which may contain other minerals. This term is applicable to any argillaceous, carbonate, or siliceous sedimentary rock which,

through destructive distillation, will yield synthetic petroleum.
(e) ''Preference lease area'' means the area reserved for leasing during the term of this lease to which Lessee may earn a preference lease right. The preference lease area for this lease is described as follows:

T. 10 S., R. 24 E., SLM, Utah.
Sec. 13, S½N½, S½;
Sec. 14, S½N½, S½;
Sec. 22, NE¼NE¼, S½NE¼, SE¼NW¼, NE¼SW¼, NE¼SE¼SW¼, W½SE¼SW¼, W½SE¼SE¼SW¼, E½SE¼SE¼, NW¼NE¼SE¼, and N½NW¼SE¼;
Sec. 23, All;
Sec. 24, All;
Sec. 25, W½W½;
Sec. 26, All;
Sec. 27, E½NE¼, SW¼NE¼, W½NE¼NE¼NW¼, W½NE¼NW¼, SE¼NW¼ and SE¼NE¼NW¼;
Sec. 35, N½N½.

T. 10 S., R. 25 E., SLM, Utah.

Sec. 18, All;
Sec. 19, All.

Containing 4,960.00 acres, more or less.

(f) ''Shale oil'' means synthetic petroleum derived from the destructive distillation of oil shale.

Section 2. Grant to Lessee

The Lessee is hereby granted, subject to the terms of this lease, the exclusive right and privilege to prospect for, drill, mine, extract, remove, beneficiate, concentrate, process and dispose of the oil shale and the products of oil shale contained within the Leased Lands as proposed in the nomination submitted in response to the Federal register notice of June 9, 2005. In accordance with plans of operation approved pursuant to section 8, the Lessee may utilize or dispose of all oil shale and oil shale products, together with the right to construct on the Leased Lands all such works, buildings, plants, structures, roads, power lines, and additional facilities as may be necessary or reasonably convenient for the mining, extraction, processing, and preparation of oil shale and oil shale products for market. The Lessee has the right to use so much of the surface of the Leased Lands as may reasonably be required in the exercise of the rights and privileges herein granted. Occupancy and use of existing structures and facilities will be authorized by the approval of this plan of development.

Section 3. Lessor's Reserved Interests in the Leased Lands

The Lessor reserves:
(a) The right to continue existing uses of the leased lands and the right to lease, sell, or otherwise dispose of the surface or other mineral deposits in the lands for uses that do not unreasonably interfere with operations of the Lessee under this lease. (b) The right to permit for joint or several use, such easements or rights-of-way, including easements in tunnels or shafts upon, through, or in the Leased Lands, as may be necessary or appropriate to the working of the Leased Lands or other lands containing mineral deposits subject to the Mineral Leasing Act of 1920, and the treatment and shipment of the products thereof by or under authority of the Lessor, its lessees, or permittees, and for other public purposes. Lessor shall condition such uses to prevent unnecessary or unreasonable interference with rights of the Lessee.

Section 4. Lease Term

The lease is issued for a term of ten years with the option for an extension not to exceed five years upon demonstration to the satisfaction of the authorized officer that a process leading to production in commercial quantities is being diligently pursued, consistent with the schedule specified in the approved plan of development. The lease is subject to

conversion to a twenty-year lease under the conditions specified in section 23.

Section 5. Rentals: Non-commercial Production

The Lessee shall pay the Lessor the statutorily established annual rental in advance for each acre or fraction thereof during the continuance of the lease of $2.00. Rental is payable annually on or before the anniversary date of the lease beginning the 6th year of the lease. Rental is waived for the first 5 years of the lease. The failure to pay rental by the anniversary date shall be grounds for termination of the lease. Should the Lessee fail to pay the full amount by the anniversary date, BLM will notify the Lessee of this failure and provide you with a grace period of 15 days from the day you receive notice to make payment in full. Should no payments be received during the grace period, the lease shall terminate without the need for further administrative proceedings.

Section 6. Royalties

(a) As long as the Lessee is not producing commercial quantities from the leasehold, as determined by the Lessor, the Lessor waives the requirement for royalty on any production.

(b) Payments under this lease shall be subject to the regulations in 30 CFR Part 218, Subpart E.

(c) Upon production for commercial purposes, the R, D & D lease will be converted to the Oil Shale Commercial Lease subject to the commercial oil shale regulations.

(d) Royalties at the rate specified in oil shale regulations shall become payable the first day of the first month after commencement of production in commercial quantities.

Section 7. Bonds

(a) Prior to conducting operations on this lease, the Lessee shall provide a bond payable to the Secretary in the amount determined by the authorized officer, conditioned upon compliance with all terms and conditions of the lease and the plan of development. This bond shall be of a type authorized by 43 CFR 3104.1 and must be sufficient to cover all costs associated with reclamation and abandonment activities. The authorized officer may require additional bond upon determining that it is necessary to assure full compliance for the operations conducted under this lease. The Lessee shall have the right to submit information to demonstrate that a lesser amount would be sufficient to remedy noncompliance and appeal the determination to the State Director.

(b) Upon request of the Lessee, the bond may be released as to all or any portion of the Leased Lands affected by exploration or mining operations, when the Lessor has determined that the Lessee has successfully met the reclamation requirements of the approved development plan and that operations have been carried out and completed with respect to these lands in accordance with the approved plan.

Section 8. Plan of Development

(a) The operator must submit to the authorized officer an exploration, mining plan, or in situ development plan describing in detail the proposed exploration, prospecting, testing, development or mining operations to be conducted. Exploration, mining plans and in situ development plans must be consistent with the requirements of the lease, license or permit for the protection of non-mineral resources and for the reclamation of the surface of the lands affected by the operations on Federal lease(s), license(s), or permits. The authorized officer will consult with any other agency involved, and will promptly approve the plans or indicate what additional information is necessary to conform to the provisions of the established requirements.

(b) The lessee/operator must submit 2 copies of the mining plan to the authorized officer for approval. An additional copy must be submitted if the surface managing agency is other than the BLM. The mining/development plan must contain, at a minimum, the following:

(1) Names, addresses and telephone numbers of those responsible for operations to be conducted under the approved plan to whom notices and orders are to be delivered, names and addresses of lessees, Federal lease serial numbers and names and addresses

of surface and mineral owners of record, if other than the United States;

(2) A general description of geologic conditions and mineral resources, with appropriate maps, within the area where mining is to be conducted;

(3) A copy of a suitable map or aerial photograph showing the topography, the area covered by the lease(s), the name and location of major topographic and cultural features and the drainage plan away from the affected area;

(4) A statement of proposed methods, of operating, including a description of the surface or underground mining methods, the proposed roads, the size and location of structures and facilities to be built, mining sequence, production rate, estimated recovery factors, stripping ratios (if applicable) and number of acres in the Federal lease(s) or permit(s) to be affected;

(4a) For in situ operations - A statement of the propose method of development that includes:

a) A description detailing the in situ methodology
b) The equipment to be used in development and extraction
c) The proposed access roads
d) The size, location and schematics of all structures and facilities to be built
e) The development sequence and schedule
f) The number of acres in the Federal lease(s) or permit(s) to be affected
g) Typical Schematics of all drilled well types including those used for heating, freezing, disposal or production activities detailing all casing and completion design including materials used in all cementing operations.
h) A detailed description of the methods and means to protect and monitor all aquifers

(5) An estimate of the quantity and quality of the mineral resources.

(6) An explanation of how ultimate maximum recovery of the resource will be achieved for the Federal lease(s). All minable portions of the deposit must be mined /developed. If a portion of the deposit is not to be mined or is to be rendered unminable by the operation, the operator/lessee must submit appropriate justification to the authorized officer for approval;

(7) Appropriate maps and cross sections showing:

(i) Federal lease boundaries and serial numbers;

(ii) Surface ownership and boundaries;

(iii) Locations of existing and abandoned mines and existing O & G well locations

(iv) Typical structure cross sections;

(v) Location of shafts or mining entries, strip pits, waste dumps, retort facilities and surface facilities; and

(vi) Typical mining or in situ development sequence, with appropriate timeframes;

(8) A narrative which addresses the environmental aspects associated with the proposed mine which includes, at a minimum, the following:

(i) An estimate of the quantity of water to be used and pollutants that may enter any receiving waters;

(ii) A design for the necessary impoundment, treatment or control of all produced water, runoff water and drainage from workings.

(iii) A description of measures to be taken to prevent or control fire, soil erosion, subsidence, pollution of surface and ground water, pollution of air, damage to fish or wildlife or other natural resources and hazards to public health and safety; and

(9) A reclamation plan and schedule for all Federal lease(s), license(s), or permit(s) detailing all reclamation activities. The reclamation plan will include for revegetation:

(i) Proposed methods of preparation and fertilizing the soil prior to replanting;

(ii) Types and mixtures of shrubs, trees or tree seedlings, grasses or legumes to be planted; and

(iii) Types and methods of planting, including the amount of grasses or legumes per acre, or the number and spacing of trees or tree seedlings, or combinations of grasses and trees;

(10) The method of abandonment of operations on Federal lease(s), license(s), and permit(s) proposed to protect the unmined recoverable reserves and other resources, including the method proposed to fill in, fence or close all surface openings which are a hazard to people or animals. For in situ operations a description of the method and materials used to plug

all abandoned development/production wells must be included;

(11) Any additional information that the authorized officer deems necessary for approval of the plan.

(12) Occupancy and use of existing structures and facilities will be authorized by the approval of this plan of development.

(13) The authorized officer may condition the approval on reasonable modifications of the plan to assure protection of the environment, health and safety, royalty accountability, and maximum efficient recovery.

(14) After plan approval, the Lessee must obtain the written approval of the authorized officer for any change in the plan approved under subsection (a).

(15) The Lessee may be required as part of plan approval to conduct operations in compliance with applicable sections of 43 CFR Part 3160, Onshore Oil and Gas Orders and 43 CFR Part 3590 which will be identified as part of the plan approval document.

Section 9. Operations on the Leased Lands

(a) The Lessee shall conduct all operations under this lease in compliance with all applicable Federal, State and local statutes, regulations, and standards, including those pertaining to water quality, air quality, noise control, threatened and endangered species, historic preservation, and land reclamation, and orders of the authorized officer (written, or if oral, reduced to writing within ten days). The Lessee shall employ best management practices to minimize impacts to other resource values.

(b) The Lessee shall avoid, or, where avoidance is impracticable, minimize, and where practicable correct, hazards to the public health and safety related to its operations on the Leased Lands.

(c) Lessee shall carry on all operations in accordance with approved methods and practices as provided in the operating regulations designated as applicable under section 8 above and approved operations plan. Activities will be conducted in a manner that minimizes adverse impacts to the land, air, water, cultural, biological, visual, and other resources, including mineral deposits not leased herein, and other land uses and users.

(d) The Lessee shall comply with all applicable state and Federal laws.

e) The Lessee shall conduct all operations in a manner that will not unreasonably interfere with operations that have prior existing rights.

Section 10. Water Rights

All water rights developed on the lease by the Lessee through operations on the Leased Lands shall immediately become the property of the Lessor. As long as the lease continues, the Lessee shall have the right to use those water rights free of charge for activities under the lease.

Section 11. Development by In Situ Methods

Where in situ methods are used for the production of shale oil, the Lessee shall not place any entry, well, or opening for such operations within 500 feet of the boundary line of the Leased Lands without the permission of, or unless directed by the authorized officer.

Section 12. Inspection

The Lessee shall permit any authorized officer or representative of the Lessor at any reasonable time:

(a) To inspect the Leased Lands and all surface and underground improvements, works, machinery, and equipment, and all books and records pertaining to operations and surveys or investigations under this lease; and

(b) To copy and make extracts from any books and records pertaining to operations under this lease.

Section 13. Reports and Maps

(a) The Lessee shall submit to the Lessor in such form as the latter may prescribe, not more than 60 days after the end of each quarter of the lease year, a report covering that quarter which shall show the amounts and quality of all products and by-products

removed and sold from the lease, the amount used for production purposes or unavoidably lost, and the amount in the storage. The report shall also show the price received for all products or by-products sold, in such detail as the Lessor prescribes. The Lessee shall file with the proper office of Lessor, no later than 30 days after the effective date thereof, any contract or evidence of other arrangement for sale or disposal of production.

(b) The Lessee shall prepare and furnish at such times and in such form as the Lessor may prescribe, maps, photographs, reports, statements and other documents required.

(c) The Lessee shall conduct surveys and monitor environmental effects as specified in the special stipulations to this lease.

Section 14. Assignment

The Lessee may assign any interest in this lease with the approval of the authorized officer, subject to the Assignor retaining liability for all obligations that accrued prior to the assignment and the provision of bond by the Assignee for all liabilities arising after the assignment. The Assignor shall maintain bond for liabilities arising in the period prior to the assignment, unless the assignee provides bond for the entire period of the lease. The Assignee shall agree to conduct the research, development and demonstration project outlined in the nomination for the lease, or to obtain BLM's approval to substitute the research, development and demonstration of another technology not currently being utilized in the Green River Formation.

Section 15. Heirs and Successors in Interest

Each obligation of this lease shall extend to and be binding upon, and every benefit shall inure to, the heirs, executors, administrators, successors, or assigns of the respective parties hereto.

Section 16. Relinquishment of lease

The Lessee may relinquish in writing at any time all rights under this lease. Upon Lessor's acceptance of the relinquishment, Lessee shall be relieved of all future obligations under the lease. The Lessee shall promptly pay all royalties due and reclaim the relinquished acreage in accordance with the plan of development.

Section 17. Remedies in Case of Default

If the Lessee fails to comply with applicable laws, regulations, or the terms, conditions, and stipulations of this lease and the noncompliance continues for a period of 30 days after service of notice thereof, this lease shall be subject to cancellation. The Lessor may (1) suspend operations until the required action is taken to correct noncompliance, or (2) institute appropriate proceedings in a court of competent jurisdiction for the forfeiture and cancellation of this lease as provided in Section 31 of the Act (30 U.S.C. 188) and for forfeiture of any applicable bond. If the Lessee fails to take prompt and necessary steps to (a) prevent loss or damage to the mine, property, or premises, (b) prevent danger to the public, or (c) avoid, minimize or, repair damage to the environment, the Lessor may enter the premises and take such measures as he may deem necessary to prevent, or correct the damaging, dangerous, or unsafe condition of the mine or any other facilities upon the Leased Lands. Those measures shall be at the expense of the Lessee.

Section 18. Delivery of Premises in Case of Forfeiture

(a) At such time as all or portions of this lease are returned to Lessor, the Lessee shall deliver to the Lessor the land leased, wells, underground support structures, and such other supports and structures necessary for the preservation of the mine workings on the leased premises or deposits and place all workings and wells in condition for suspension or abandonment. Within 180 days thereof, Lessee shall remove from the premises all other structures, machinery, equipment, tools, and materials as

required by the authorized officer. Any such structures remaining on the Leased Lands beyond the 180 days, or approved extension thereof, shall become the property of the Lessor. Lessee shall either remove all such property or shall continue to be liable for the cost of removal and disposal in the amount actually incurred by the Lessor.

(b) Lessee shall reclaim all lands which have been disturbed and dispose of all debris or solid wastes in an approved manner in accordance with the schedule established in the plan of development and maintain bond coverage until such reclamation is complete.

Section 19. Protection of Proprietary Information

(a) This lease, and any activities there under, shall not be construed to grant a license, permit or other right of use or ownership to the Lessor, or any other person, of the patented processes, trade secrets, or other confidential or privileged technical information (hereafter in this section called "technical processes") of the Lessee or any other party whose technical processes are embodied in improvements on the Leased Lands or used in connection with the lease.

(b) Notwithstanding any other provision of this lease, the Lessor agrees that any technical processes obtained from the Lessee which are designated by the Lessee as confidential shall: (1) Not be disclosed to persons other than employees of the Federal Government having a need for such disclosures and (2) not be copied or reproduced in any manner. The Lessor further agrees this material may not be used in any manner that will violate their proprietary nature. (c) Prior to any disclosure pursuant to a Freedom of Information Act (FOIA) request, the Bureau will notify the submitter of the specific information which it has initially determined to release and give it thirty (30) days to provide a justification for the nondisclosure of the information under exemption 4 or other relevant exemptions of FOIA. The submitter's justification should address in detail, pursuant to the procedures in 43 CFR 2.23, whether the information: (1) Was submitted voluntarily and falls in a category of information that the submitter does not customarily release to the public; or (2) If the information was required to be submitted, how substantial competitive or other business harm would likely result from release. If after reviewing the submitted information, BLM decides to release the information over the submitter's objections, it will notify the submitter that it intends to release the information 10 business days after the submitter's receipt of the notice.

Section 20. Lessee's Liability to the Lessor

(a) The Lessee shall be liable to the United States for any damage suffered by the United States in any way arising from or connected with Lessee's activities and operations conducted pursuant to this lease, except where damage is caused by employees or contractors of the United States acting within the scope of their authority or contract.

(b) The Lessee shall indemnify and hold harmless the United States from any and all claims arising from or connected with Lessee's activities and operations under this lease.

(c) In any case where liability without fault is imposed on the Lessee pursuant to this section, and the damages involved were caused by the action of a third party, the rules of subrogation shall apply in accordance with the law of the jurisdiction where the damage occurred.

Section 21. State Director Review and Appeals

The Lessee shall have the right to request State Director Review and to appeal orders or decisions of the BLM under 43 CFR Subpart 3165.

Section 22. Special Stipulations

The special stipulations that are attached to and made a part of this lease are imposed upon the Lessee, and the Lessee's employees and agents. The failure or refusal to comply with these stipulations shall be deemed a failure of the Lessee to comply with the terms of the lease. The special stipulations may be revised or amended, in writing, by mutual consent of

the Lessee and Lessor following appropriate notice to the public.

Section 23. Conversion

(a) The Lessee shall apply for conversion of the research, development and demonstration lease to a commercial lease no later than 90 days after the commencement of production in commercial quantities. The Lessee shall have the exclusive right to acquire any or all portions of the preference lease area for inclusion in the commercial lease, up to a total of 5,120 contiguous acres, upon (1) documenting to the satisfaction of the authorized officer that it has produced commercial quantities of shale oil from the lease. Documentation to the Authorized Officer (AO) should contain a narrative statement that includes:

(a) The anticipated scope of operations, the schedule of operations, and the types of equipment to be used;

(b) The relationship, if any, between operations planned on the land applied for and existing or planned operations and facilities on adjacent lands;

(c) Estimated revenues;

(d) The estimated costs that a prudent person would consider before deciding to operate the proposed project, including but not limited to, the cost of developing the oil shale through mining or in-situ processing, processing the produced shale oil to make it salable, transporting the final product to market, paying applicable royalties and taxes, and complying with applicable laws and regulations, the proposed lease terms, and special stipulations.

The authorized officer may request from the applicant, or the applicant may submit, any other information necessary to conduct an environmental analysis of the proposed operation, formulate mitigating measures and lease terms and determine commercial quantities. (2) Payment of a bonus based on the Fair Market Value of the lease, to be determined by the Lessor utilizing criteria to be developed through the rulemaking described in subsection(b) or other process for obtaining public input; (3) Documentation of the Lessee's consultation with State and local officials to develop a plan for mitigating the socioeconomic impacts of commercial development on communities and infrastructure; (4) Provision of adequate bond to cover all costs associated with reclamation and abandonment of the expanded lease area; and (5) BLM's determination, following analysis pursuant to the National Environmental Policy Act (NEPA), that commercial scale operations can be conducted, subject to mitigation measures to be specified in stipulations or regulations, without unacceptable environmental consequences.

(b) Such commercial lease shall contain terms consistent with regulations to be developed by the Secretary pursuant to section 21 of the Act and stipulations developed through appropriate NEPA analysis.

c) The Secretary, whenever he/she determines it necessary to promote development or finds that the lease cannot be successfully operated under its terms, may waive, suspend or reduce the rental, or reduce the royalty but not advance royalty, on an entire leasehold, or on any deposit, tract or portion thereof, except that in no case shall the royalty be reduced to zero percent. An application for any of these benefits shall be filed with the authorized officer. The royalty shall be subject to the readjustment of lease terms at the end of the 20th lease year and each 10 year period thereafter.

Section 24. Reimbursable Costs

Lessee will pay BLM the actual and reasonable costs after the signing of this Lease for the review and approval of applications for permits, plans of exploration or development, notices, and similar submissions. Lessee's payment will be due prior to receiving any requested permits or approvals. If the Lessee requests an estimate, BLM will review complete submissions and provide the Lessee with an estimation of costs of required processing, analyses, research and documentation. These costs may be according to a schedule approved by the BLM State Director. The recoverable costs include, but are not limited to, BLM's costs to: (1) assure compliance with the National Environmental Policy Act, the National Historic Preservation Act, or other environmental, natural resource, or cultural resource statutes or regulations; (2) process the submission

and/or provide a responsive document and any supporting documents; and (3) review monitoring, engineering, construction, and operation plans for the maintenance or abandonment of any authorized facility. If the Lessee withdraws an application, plan, or other submission, BLM may collect the costs of its work on that submission until the date of withdrawal and all obligations under the lease terms/conditions/stipulations are met. BLM may also collect its costs when it denies or modifies an application, plan, notice, or for any other submission.

Section 25. Special Stipulations.

Attached to and made a part of this lease.

==========

THE UNITED STATES OF AMERICA

Oil Shale Exploration Company, LLC
(Company or Lessee Name)

BY: _____
(Signature of Lessee)

Daniel G. Elcan
Managing Member
(Title)

June 18, 2007
(Date)

By C. Stephen Allred

_____
(DOI)

Assistant Secretary
Land and Minerals Management
(Title)

June 21, 2007
(Date)

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Special Stipulations:

Section 25: The following terms, conditions, stipulations, and other mitigation measures are incorporated in the Proposed Action as outlined in the subject EA, and are comprised of the BLM specifications and guidelines, and the environmental commitments put forth by OSEC. These measures were designed for site-specific mitigation so as to lessen the potential for adverse effects to public lands administered by the BLM Vernal Field Office. These measures will be stipulated, as appropriate, in any Plan of Development approval. Following the BLM approval of a Plan of Development, OSEC will make oil shale available to other entities for oil shale research purposes up to 50% of the existing oil shale stockpiles at minimal cost for loading, and upon reentering the mine up to 5% of the monthly oil shale production sold to a third party. This mined material will be provided to third parties, approved by the BLM, at a price to cover operating costs, which include labor, energy, materials and supplies, local taxes, insurance, lifting and loading, and a rate of return on capital as described in the Office of Management and Budget (OMB) Circular A-94, *Guidelines and Discount Rates for Benefit Cost Analysis of Federal Programs*. Presently, the average real rate of return of 7% is described in OMB Circular A-94, Item Section 8 c(1) and c(3), *Discount Rate Policy.*

In addition, these terms, conditions, stipulations and other mitigation measures will be incorporated, as appropriate, into any right-of-way grant issued under the applicable regulations contained in 43 CFR Part 2800.

Terms/Conditions/Stipulations

Use of White River Oil Shale Mine Facilities

Surface Buildings and Equipment: The lessee may occupy and utilize the buildings and equipment that are on the leased lands. These buildings include the mine administration building, water treatment plant, sewage treatment plant, electrical building, 16-foot diameter shaft fan support building and the hoist with the headframe from the 30-foot diameter shaft. The lessee may, at his own expense refurbish, remodel or update the buildings as necessary for his use. The buildings must be utilized as part of the operation and other uses are not authorized. The buildings may not be sold, rented or leased to other entities. The lessor does not make any guarantees on the buildings structural integrity or usefulness. The lessee may use the buildings at his "own risk"

Underground Facilities: The lessee may occupy and utilize (including ore extraction) the underground facilities (mine). The mine includes all drifts, declines, slopes, rooms, shafts and adits on the site. The condition of the mine is unknown. Hazards such as methane, hydrogen sulfide gas, naturally occurring oil flows and mine water exist. Other hazards may exist such as oxygen deficient air; roof, rib and

floor failures and others. Prior to any entrance to the mine, plans must be submitted and approved by the Mine Safety, Health Administration, Bureau of Land Management and the Utah Division of Oil, Gas and Mining.

Miscellaneous Facilities: The lessee may occupy and utilize the existing roads, powerlines and helicopter pad and any other improvements on the site.

Disposal/Reclamation: Once the lessee utilizes a structure, equipment, mine facility helicopter pad, road or site, he will be responsible for its disposal, abandonment and site reclamation as approved by the Authorized Officer.

Waste Certification: Upon abandonment of mine sections, transfer of operations, assignment of rights, or relinquishment of the leased area, and prior to reclamation activities, the Lessee must provide certification to the Lessor that during the term of the lease, there have been no reportable quantities of hazardous substances (40 CFR 302.4), or of used oil (Utah State Administrative Code R315-15), discharged, deposited, or released within the leased area, either on the surface or underground. Lessee must also certify that all remedial actions necessary to protect human health and the environment with respect to any such discharges, deposits or releases, either on the surface or underground within the leased area have been taken. In addition, the Lessee must provide to the Lessor a complete list of all hazardous substances and hazardous materials including their Chemical Abstract Services Registry Numbers, as well as the oil and petroleum products used, stored on, or delivered to, the leased area. Such disclosure will be in addition to any other disclosure required by law or agreement.

Hazardous Materials: If there has been a discharge, deposit or release, of hazardous substances, or of used oil, within the leased area prior to the time application is made for the relinquishment of all or a portion of the leased area, the Lessee, at their expense, shall provide to the Authorized Officer, either a Phase II Environmental Site Assessment, including sampling; an American Society for Testing and Materials Environmental Site Assessment (E1527-05; 2005, or latest version), or other equivalent report, (including the requirement of 40 CFR 312), as well as any risk analysis undertaken by Lessee, as determined by the Authorized Officer. Such report shall document existing site conditions. Prior to the submission of the Phase II Environmental Site Assessment, or other report, the Lessee shall provide the Authorized Officer with a proposed Work Plan, including a schedule, for their approval. Upon approval of the Work Plan, the Lessee shall complete the site assessment. To the extent the Authorized Officer determines that further investigation of existing site conditions is necessary prior to relinquishment acceptance, the Lessee shall conduct such investigations.

Indemnification: The Lessee shall indemnify and hold harmless the United States from any and all claims arising out of the lessee's activities and operations under the lease.

In addition to design criteria and mitigation identified in the Proposed Action and the plan of development, the BLM will incorporate, as appropriate, the following mitigation

measures as shown by resource topic. All plans required by the following measures will require approval by the BLM.

Air Quality

OSEC will acquire appropriate air quality permits, comply with permit stipulations, implement emission control measures, and monitor air quality control required by the air quality permitting agency. In addition, OSEC will:

- Avoid roads and other surface construction activities with soils susceptible to wind erosion, as appropriate, to reduce the amount of fugitive dust generated by traffic and other activities.
- Use dust inhibitors to prevent fugitive dust problems. Measures, such as the use of water trucks and moisture control and baghouses, will be implemented to minimize fugitive dust emissions.
- Establish and enforce speed limits on roads where needed to reduce fugitive dust problems.
- Cooperate with atmospheric deposition and visibility impact monitoring programs.
- Mitigate fugitive dust emissions using erosion control measures, and control dust during construction, wind events, and stockpiles, as necessary.
- OSEC will obtain and comply with all necessary air permits and install, operate and maintain air emission control devices on the ATP system during Phase 2 and Phase 3 and on units of the wastewater treatment system and hydrotreatment system during Phase 3. This will include, for Phase 3, Best Available Control Technology (BACT) that complies with the Prevention of Significant Deterioration (PSD) requirements of the Clean Air Act.

Wastes

- The environmental controls to be required for the disposal of spent shale will be approved by the BLM as well as other regulatory authorities as appropriate. The spent shale disposal areas for Phases 2 and 3 will be designed and constructed to prevent contact with storm water from other areas and minimize infiltration of precipitation that lands on the shale pile. The disposal areas will also have drainage features to control runoff. Monitoring of the spent shale disposal areas and runoff areas will be conducted throughout the project. Until the Phase 1 and Phase 2 testing results demonstrate that the spent shale is not a hazardous material, it will be isolated from the environment. The results of the Phase 1 and, if necessary, Phase 2 testing will be used to determine the continued need for an impervious liner to isolate the spent shale from the environment.
- Prior to and during mine dewatering, testing will be performed and water that does not meet water quality standards will be contained and transported for off-site treatment, unless the water can be treated on-site to meet

applicable water quality standards for on-site surface disposal in accordance with all applicable rules, regulations, and/or permits.

- OSEC will develop and implement all necessary plans and engineering measures (e.g., bermed, lined and covered storage areas) to comply with the Resource Conservation and Recovery Act and to properly manage hazardous wastes and oil wastes generated during Phases 2 and 3.
- OSEC will develop and implement a plan for the handling and disposal of construction related wastes at licensed off-site facilities.
- OSEC will dispose of (Phase 2) or treat on-site (Phase 3) any process waters that do not meet water quality standards prior to re-use for moisture control or discharge on the 160-acre lease.
- OSEC will evaluate and upgrade as necessary the on-site sewage treatment facility and treat all sewage waters generated on the 160-acre lease.
- If monitoring shows adverse impacts to soil quality or the potential for adverse impacts to ground water quality beneath the site from the spent shale disposal during Phase 2, OSEC will notify the BLM and implement measures to address any impacts.
- If lighter debris becomes wind-borne and is transported away from the construction area, OSEC will implement measures to collect all such debris and to have it properly disposed of.
- In the event of a spill of sulfur, nitrogen, or spent catalyst wastes, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to remove as much of the discharged material from the environment as possible.
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the response measures.
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that adverse long-term impacts are minimized.
- In the event an accidental release of mine water that does not meet water quality standards, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to pump up as much of the discharged water into tanks as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no adverse long-term impacts remain.

- In the event of an accidental release of water generated during retorting or process washdown operations that does not meet water quality standards, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to pump up as much of the discharged water into tanks as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.
- In the event of an accidental release of waste oils or oily sludges, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to remove as much of the discharged wastes from the spill area as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.
- In the event that a spill of sanitary wastes from a portable unit occurs, the material will be cleaned up, contained as quickly as possible, and moved to an approved disposal facility.
- In the event of an accidental release of untreated or partially treated effluent from the sanitary waste water treatment facility, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the release and to remove as much of the discharged wastes from the spill area as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.

Water Resources and Water Quality

OSEC will obtain necessary federal and state permits, and will comply with the Corps of Engineers Nationwide Permit requirements, if appropriate; Stormwater discharge permit, and all other applicable water quality permitting requirements to

minimize impacts to water quality. OSEC will minimize impacts to water quality, surface and ground, by implementing the following measures:

- OSEC will evaluate and implement measures to reduce, to the extent practicable, water usage for the process. If water is withdrawn from the White River or from the White River alluvium, the monitoring will consist of (1) measuring water withdrawal from the White River and (2) measuring the ground water level in two piezometers located in the alluvium near the withdrawal point(s). If ground water is extracted from the Birds Nest Aquifer, the monitoring will include a piezometer in the Birds Nest Aquifer and a gauging station along Evacuation Creek. It is anticipated that such monitoring would be daily for the first two weeks of water withdrawals, weekly for the next six weeks, and monthly thereafter.
- If the initial water level monitoring indicates that potential impacts could be materially greater than anticipated, OSEC will modify its selected water supply system.
- OSEC will obtain all necessary federal and state permits and will comply with all applicable water-quality permitting requirements to minimize impacts to water quality.
- Develop a groundwater monitoring and response plan and continue the monitoring program as long as needed to determine that the site is acceptable for abandonment.
- Obtain a stormwater discharge permit and submit a stormwater management plan to the BLM authorized officer.
- Prepare and implement a Spill Prevention Control and Countermeasure (SPCC) Plan for BLM approval.
- Submit a water monitoring and response plan to the BLM authorized officer with the Plan of Development.

Soils

- OSEC will develop and implement a soil erosion/sediment control plan to stipulate methods for minimizing soil erosion or sedimentation using appropriate practices, such as maximum allowable slopes, silt fencing or straw wattles.
- OSEC will develop and implement a soil management plan stipulating appropriate practices for the handling, staging, and re-use of topsoil and soil reclamation activities to be conducted following construction, such as soil pile seeding and reclamation requirements.
- Additional soil erosion and sediment control measures and remediation of damaged site soils may be necessary if the applicant-committed measures are found to be inadequate.
- Reseeding may be necessary if the initial application is unsuccessful.

Geology/Energy Production/Mineral Use

- OSEC will coordinate its activities with the oil and gas lessee for the 160-acre lease and lessees along the utility rights-of-way to avoid development conflicts.
- Gilsonite veins will be crossed by the proposed gas pipeline within existing pipeline rights-of-way. OSEC will coordinate construction of utility lines the owner of gilsonite mines crossed by the proposed utility line right-of-way.

Floodplains

- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a minimum depth of three meters below grade. Every effort will be made to conduct all drilling activities associated with the gas pipeline installation within already disturbed areas. Upon completion of this work, reclamation activities will be undertaken to return disturbed areas to pre-construction conditions to the extent possible.
- Upon completion of installation of any new water wells and associated utilities in the floodplain, reclamation activities will be undertaken to return disturbed areas to pre-construction conditions to the extent possible.
- Following a major flood in the White River or a flash flood in an ephemeral stream, damaged utility lines, access roads, and equipment would be repaired and exposed pipe would be reburied. These measures would minimize residual project-related impacts from flooding.

Wetlands/Riparian Areas

- Surveys will be conducted prior to utility construction to establish the presence or absence of wetlands or riparian areas. If wetlands or riparian areas are present, they would be avoided to the extent practicable. If avoidance is not possible, disturbance within the wetland or riparian areas would be minimized to the extent practicable in accordance with any state or federal wetland permitting requirements.
- OSEC will limit construction equipment working in wetlands or riparian areas to that essential for clearing, trench excavation, pipe fabrication and installation, backfilling, and restoration.
- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a minimum depth of three meters below the channel bottom. Every effort will be made to conduct all drilling activities in existing disturbed areas adjacent to Highway 45. The power line will be constructed to span the width of the river with poles located in upland areas.
- OSEC will prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, concrete coating, and refueling activities within 200 feet of any wetland or riparian area.

- Any impacts to wetlands and riparian areas would be minimized by implementing measures to reduce the soil disturbance and enhance restoration of vegetation within wetlands and riparian areas. These mitigation measures may include:
    - Limit construction equipment working in wetlands and riparian zones to that essential for clearing, trench excavation, pipe fabrication and installation, backfilling, and restoration.
    - Limit stump removal, grading, topsoil segregation, and excavation in wetlands and riparian zones to the area immediately over the trench line to avoid excessive disruption of soils and the native seed and rootstock within the soils.
    - Prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, concrete coating, and refueling activities within 200 feet of any wetland or riparian area.
    - Equipment working in wetlands and riparian zones will be cleaned of any possible weed seeds prior to bringing it into these areas.
    - Implement measures to control introduction and spread of invasive, non-native species into wetlands and riparian areas.

Threatened/Endangered Wildlife Species

- Pre-construction clearance surveys will be conducted in the spring prior to construction to identify active bald eagle nests within 1.0 mile of the surface occupancy area and in the winter to identify active bald eagle roosts within 0.5 mile of the project site and utility rights-of-way. Construction activities will not occur within 1.0 mile of any active bald eagle nest without further consultation with the USFWS. Construction activities will not be conducted within 0.5 mile of active roost sites from November 1 through March 31.
- Mitigation solutions such as fencing, flagging, or floatation balls will be thoroughly considered and implemented if necessary at water disposal sites to reduce contamination of wildlife if monitoring results in a conclusion that the water may be toxic.
- The lessee will make a one-time payment which is calculated by multiplying the project's average annual water depletion by the depletion charge in effect at the time the payment is made. The average depletion is estimated at approximately 247 acre-feet per year for the two year test period of Phase 3. If the average depletion is found to be larger than 247 acre-feet per year over this test period, then consultation with USFWS will be reinitiated. The lessee will be required to pay the one-time contribution to the Recovery Program to the USFWS.

Fish and Wildlife Including Special Status Species other than FWS Candidate or Listed Endangered or Threatened Species

- OSEC will conduct clearance surveys, each spring prior to construction, to identify active raptor nests within 0.5 mile of the construction rights-of-way. Construction activities will not be conducted within 0.5 mile of active raptor

nests between February 1 and August 31 or until fledging and dispersal of the young.

- OSEC will conduct clearance surveys each spring prior to construction, to identify presence of any BLM sensitive species. If any BLM sensitive species are found, OSEC will consult with the BLM to determine an appropriate action to reduce impacts.
- If bats are found in the White River Mine, OSEC will install one-way doors or other suitable mitigation at the mine shaft entrances allowing sufficient time prior to re-opening the mine for bats to leave but not to re-enter the mine shafts.

Threatened/Endangered Plant Species

- Following the completion of utility construction, disturbed areas will be reclaimed in a timely manner and in accordance with a project revegetation plan.
- OSEC will conduct clearance surveys each spring prior to construction along the rights-of-way to identify the presence of any T&E plant species.

Vegetation Including Special Status Species other than FWS Candidate or Listed Endangered or Threatened Species

- OSEC will minimize vegetation removal to the extent necessary to allow for safe and efficient construction activities.
- OSEC will develop and implement a revegetation/reclamation plan using appropriate practices to restore disturbed areas to pre-construction conditions to the extent practicable.
- OSEC will conduct clearance surveys each spring prior to construction along the rights-of-way to identify the presence of any BLM sensitive plant species.

Invasive, Non-Native Species

- An invasive, non-native weed management plan, conforming to the requirements of the BLM and local weed management agencies, will be adopted and followed for the project.
- A pesticide use permit will be submitted to and approved by the Authorized Officer prior to implementation of weed control.

Recreation

- The RD&D facility on the 160-acre lease will minimize potential light pollution by limiting the height of light poles and using light shields provided that use of such shields does not affect worker safety.
- OSEC will minimize light and sound pollution at the White River shoreline by use of topographic shielding to ensure that recreational experiences within the Book Cliffs Extensive Recreation Management Area (ERMA) and/or proposed White River Special Recreation Management Area (SRMA) are not diminished.

in the event that such sites are discovered during construction activities, and develop steps to prevent damage to any such discoveries, consistent with best management practices.

- If suspected fossil materials are uncovered during construction or project operations, the operator will stop work immediately and the Authorized Officer must be contacted. Activities will not resume until the Authorized Officer can assess the situation and advise whether additional mitigation is needed.
- Fossil specimens, if any, recovered during the project that are considered of scientific importance will be curated into the collections of a museum repository acceptable to the BLM.

Special Designation Areas

- OSEC will construct the proposed power line immediately adjacent to the existing power line at the White River crossing to minimize additional impacts to visual resources within potential Special Designation Areas.
- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a depth of three meters below the channel bottom. The crossing will occur at the already disturbed Highway 45 crossing location and every effort will be taken to conduct drilling activities in already-disturbed areas of the floodplain to protect the Outstanding Remarkable Values and scenic classification of the eligible WSR.
- Upon completion of construction, disturbed areas will be restored to preconstruction conditions to the extent practicable in accordance with a project reclamation and revegetation plan.
- Power poles will be located to minimize their view from eligible WSR and ACEC areas.

Appendix C
Right-of-Way Agreements

FORM 2800-14
(August 1985)

Issuing Office
Vernal Field Office

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
RIGHT-OF-WAY GRANT

SERIAL NUMBER UTU-85857

1. A right-of-way is hereby granted pursuant to Title V of the Federal Land Policy and Management Act of October 21, 1976 (90 Stat. 2776; 43 U.S.C. 1761).

2. Nature of Interest:

   a. By this instrument, the holder:

      Oil Shale Exploration Company, LLC
      3601 Spring Hill Business Park, Suite 201
      Mobile, Alabama 36608

   receives a right to construct, operate, maintain, and terminate a water retention dam/pond site and a drainage channel, on public lands described as follows:

      T. 10 S., R. 24 E., SLM, Utah
      Sec. 15, SE¼SW¼, SW¼SE¼;
      22, W½NE¼, E½NW¼, NE¼SW¼.

   b. The right-of-way area granted herein is a variable width, approximately 5,600 feet long and contains 26.9 acres, more or less.

   c. This instrument shall terminate on December 31, 2026 unless, prior thereto, it is relinquished, abandoned, terminated, or modified pursuant to the terms and conditions of this instrument or of any applicable Federal law or regulation.

   d. This instrument may be renewed. If renewed, the right-of-way shall be subject to the regulations existing at the time of renewal and any other terms and conditions that the authorized officer deems necessary to protect the public interest.

e. Notwithstanding the expiration of this instrument or any renewal thereof, early relinquishment, abandonment, or termination, the provisions of this instrument, to the extent applicable, shall continue in effect and shall be binding on the holder, its successors, or assigns, until they have fully satisfied the obligations and/or liabilities accruing herein before or on account of the expiration, or prior termination, of the grant.

3. Rental:

For and in consideration of the rights granted, the holder agrees to pay the Bureau of Land Management fair market value rental as determined by the authorized officer unless specifically exempted from such payment by regulation. Provided, however, that the rental may be adjusted by the authorized officer, whenever necessary, to reflect changes in the fair market rental value as determined by the application of sound business management principles, and so far as practicable and feasible, in accordance with comparable commercial practices. Rental payments, if applicable, should be submitted to the following address:

BLM Vernal Field Office
170 South 500 East
Vernal, Utah 84078

4. Terms and Conditions:

a. This grant is issued subject to the holder's compliance with all applicable regulations contained in Title 43 Code of Federal Regulations part 2800.

b. Upon grant termination by the authorized officer, all improvements shall be removed from the public lands within 90 days, or otherwise disposed of as provided in paragraph (4)(d) or as directed by the authorized officer.

c. Each grant issued for a term of 20 years or more shall, at a minimum, be reviewed by the authorized officer at the end of the 20th year and at regular intervals thereafter not to exceed 10 years. Provided, however, that a right-of-way granted herein may be reviewed at any time deemed necessary by the authorized officer.

d. The stipulations, plans, maps, or designs set forth in Exhibit A, B, and C, dated September 11, 2007, and attached hereto, are incorporated into and made a part of this grant

instrument as fully and effectively as if they were set forth herein in their entirety.

e. Failure of the holder to comply with applicable law or any provision of this right-of-way grant shall constitute grounds for suspension or termination thereof.

f. The holder shall perform all operations in a good and workmanlike manner so as to ensure protection of the environment and the health and safety of the public.

g. The holder shall construct, operate, and maintain the facilities, improvements, and structures within this right-of-way in strict conformity with the plan of development dated September 11, 2007. Any relocation, additional construction, or use that is not in accord with the approved plan of development shall not be initiated without the prior written approval of the authorized officer. Noncompliance with the above will be grounds for an immediate temporary suspension of activities if it constitutes a threat to public health and safety or the environment.

IN WITNESS WHEREOF, The undersigned ac[redacted] to the terms and conditions of this right-of-way gran[redacted]

(Signature of Holder)	(Signature of Authorized Officer)
(Title)	AFM, Lands & Minerals (Title)
(Date)	(Effective Date of Grant)

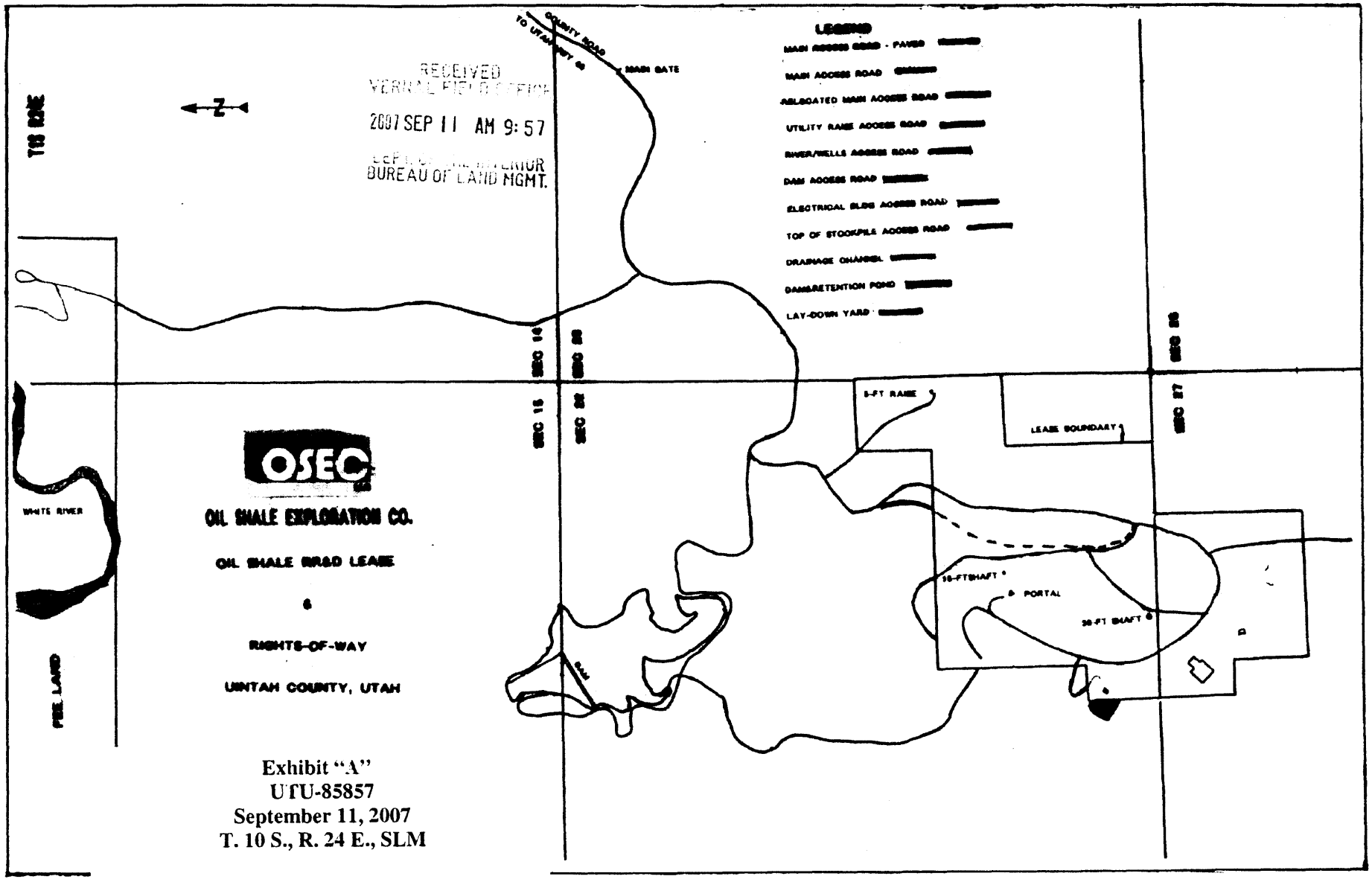

Exhibit "A"
UTU-85857
September 11, 2007
T. 10 S., R. 24 E., SLM

Plan of Development
For
Drainage Channel & Retention Dam Site
Oil Shale Exploration Company, LLC
Right-of-Way Application

The existing drainage channel and the retention dam/pond, though off of the 160-acre RD&D Lease, are integral parts of the RD&D Lease area drainage system. The dam was built in the early 1980's by a previous lessee. The features included in this application are essential to the operation of the White River Mine site.

The existing drainage channel runs north from the White River Mine site, located on the OSEC 160-acre Oil Shale RD&D Lease, to the existing retention dam. The dam and the storage basin upstream from the dam are included in this application. No new construction or modifications are planned for the drainage channel or the retention facilities. This right-of-way is located north of the RD&D Lease and is entirely on federal land administered by the BLM.

The natural drainage channel from the 160-acre RD&D Lease boundary north to the retention dam storage basin is 3,600-feet long with an average width of 20 feet. The channel right-of-way will be 40 feet wide, which is 20 feet on either side of the center line of the channel. The existing dam, storage basin and infrastructure, as shown on the attached location map, are included in this right-of-way. The storage basin includes the area below the 5195-foot elevation contour. The total area for the right-of-way is 26.9 acres, more or less. There are no reasonable alternatives for the drainage channel or the retention dam because the drainage channel is an existing, naturally-occurring, feature that drains the area and the dam has already been constructed.

The water that flows down the drainage channel into the retention pond will consist mainly of storm/snow melt water. The water pumped from the underground mine workings during mine reopening will be discharged into the drainage channel if its quality permits it. No mine or process water that does not meet federal or state standards will be discharged into the drainage system.

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The physical features included in this right-of way will be used year-round.

No other facilities are included in the right-of-way request.

The term of the right-of-way will be 20 years or until the RD&D lease is relinquished, or until the 4,960-acre preferential commercial lease is issued to the RD&D Lease lessee; in the case of the latter, the right-of-way area will be modified to recognize the new lease boundary.

Use of these existing off-site facilities to support the BLM Oil Shale RD&D Leasing Program will minimize new construction on public land and provide a means to capture and contain waters from the project that might otherwise reach the White River.

On-going costs associated with this right-of-way are expected to be limited to necessary weed and brush control. Weed and brush control requiring the use of herbicides will be done in accordance with a BLM-approved Pesticide Use Proposal.

There should be no new environmental impacts from OSEC using the channel and dam. Potential environmental effects of the RD&D project were addressed in the BLM Oil Shale RD&D Lease Environmental Assessment.

There should be minimal impact since structures already exist. Any potential effects on the plant, fish and animal population of the area were addressed in the BLM Oil Shale RD&D Lease Environmental Assessment.

The public will benefit if the Oil Shale RD&D Lease effort provides meaningful results leading to a new commercial source of crude oil.

Special Stipulations:

Section 25: The following terms, conditions, stipulations, and other mitigation measures are incorporated in the Proposed Action as outlined in the subject EA, and are comprised of the BLM specifications and guidelines, and the environmental commitments put forth by OSEC. These measures were designed for site-specific mitigation so as to lessen the potential for adverse effects to public lands administered by the BLM Vernal Field Office. These measures will be stipulated, as appropriate, in any Plan of Development approval. Following the BLM approval of a Plan of Development, OSEC will make oil shale available to other entities for oil shale research purposes up to 50% of the existing oil shale stockpiles at minimal cost for loading, and upon reentering the mine up to 5% of the monthly oil shale production sold to a third party. This mined material will be provided to third parties, approved by the BLM, at a price to cover operating costs, which include labor, energy, materials and supplies, local taxes, insurance, lifting and loading, and a rate of return on capital as described in the Office of Management and Budget (OMB) Circular A-94, *Guidelines and Discount Rates for Benefit Cost Analysis of Federal Programs*. Presently, the average real rate of return of 7% is described in OMB Circular A-94, Item Section 8 c(1) and c(3), *Discount Rate Policy*.

In addition, these terms, conditions, stipulations and other mitigation measures will be incorporated, as appropriate, into any right-of-way grant issued under the applicable regulations contained in 43 CFR Part 2800.

Terms/Conditions/Stipulations

Use of White River Oil Shale Mine Facilities

Surface Buildings and Equipment: The lessee may occupy and utilize the buildings and equipment that are on the leased lands. These buildings include the mine administration building, water treatment plant, sewage treatment plant, electrical building, 16-foot diameter shaft fan support building and the hoist with the headframe from the 30-foot diameter shaft. The lessee may, at his own expense refurbish, remodel or update the buildings as necessary for his use. The buildings must be utilized as part of the operation and other uses are not authorized. The buildings may not be sold, rented or leased to other entities. The lessor does not make any guarantees on the buildings structural integrity or usefulness. The lessee may use the buildings at his "own risk"

Underground Facilities: The lessee may occupy and utilize (including ore extraction) the underground facilities (mine). The mine includes all drifts, declines, slopes, rooms, shafts and adits on the site. The condition of the mine is unknown. Hazards such as methane, hydrogen sulfide gas, naturally occurring oil flows and mine water exist. Other hazards may exist such as oxygen deficient air; roof, rib and

floor failures and others. Prior to any entrance to the mine, plans must be submitted and approved by the Mine Safety, Health Administration, Bureau of Land Management and the Utah Division of Oil, Gas and Mining.

Miscellaneous Facilities: The lessee may occupy and utilize the existing roads, powerlines and helicopter pad and any other improvements on the site.

Disposal/Reclamation: Once the lessee utilizes a structure, equipment, mine facility helicopter pad, road or site, he will be responsible for its disposal, abandonment and site reclamation as approved by the Authorized Officer.

Waste Certification: Upon abandonment of mine sections, transfer of operations, assignment of rights, or relinquishment of the leased area, and prior to reclamation activities, the Lessee must provide certification to the Lessor that during the term of the lease, there have been no reportable quantities of hazardous substances (40 CFR 302.4), or of used oil (Utah State Administrative Code R315-15), discharged, deposited, or released within the leased area, either on the surface or underground. Lessee must also certify that all remedial actions necessary to protect human health and the environment with respect to any such discharges, deposits or releases, either on the surface or underground within the leased area have been taken. In addition, the Lessee must provide to the Lessor a complete list of all hazardous substances and hazardous materials including their Chemical Abstract Services Registry Numbers, as well as the oil and petroleum products used, stored on, or delivered to, the leased area. Such disclosure will be in addition to any other disclosure required by law or agreement.

Hazardous Materials: If there has been a discharge, deposit or release, of hazardous substances, or of used oil, within the leased area prior to the time application is made for the relinquishment of all or a portion of the leased area, the Lessee, at their expense, shall provide to the Authorized Officer, either a Phase II Environmental Site Assessment, including sampling; an American Society for Testing and Materials Environmental Site Assessment (E1527-05; 2005, or latest version), or other equivalent report, (including the requirement of 40 CFR 312), as well as any risk analysis undertaken by Lessee, as determined by the Authorized Officer. Such report shall document existing site conditions. Prior to the submission of the Phase II Environmental Site Assessment, or other report, the Lessee shall provide the Authorized Officer with a proposed Work Plan, including a schedule, for their approval. Upon approval of the Work Plan, the Lessee shall complete the site assessment. To the extent the Authorized Officer determines that further investigation of existing site conditions is necessary prior to relinquishment acceptance, the Lessee shall conduct such investigations.

Indemnification: The Lessee shall indemnify and hold harmless the United States from any and all claims arising out of the lessee's activities and operations under the lease.

In addition to design criteria and mitigation identified in the Proposed Action and the plan of development, the BLM will incorporate, as appropriate, the following mitigation

measures as shown by resource topic. All plans required by the following measures will require approval by the BLM.

Air Quality

OSEC will acquire appropriate air quality permits, comply with permit stipulations, implement emission control measures, and monitor air quality control required by the air quality permitting agency. In addition, OSEC will:

- Avoid roads and other surface construction activities with soils susceptible to wind erosion, as appropriate, to reduce the amount of fugitive dust generated by traffic and other activities.
- Use dust inhibitors to prevent fugitive dust problems. Measures, such as the use of water trucks and moisture control and baghouses, will be implemented to minimize fugitive dust emissions.
- Establish and enforce speed limits on roads where needed to reduce fugitive dust problems.
- Cooperate with atmospheric deposition and visibility impact monitoring programs.
- Mitigate fugitive dust emissions using erosion control measures, and control dust during construction, wind events, and stockpiles, as necessary.
- OSEC will obtain and comply with all necessary air permits and install, operate and maintain air emission control devices on the ATP system during Phase 2 and Phase 3 and on units of the wastewater treatment system and hydrotreatment system during Phase 3. This will include, for Phase 3, Best Available Control Technology (BACT) that complies with the Prevention of Significant Deterioration (PSD) requirements of the Clean Air Act.

Wastes

- The environmental controls to be required for the disposal of spent shale will be approved by the BLM as well as other regulatory authorities as appropriate. The spent shale disposal areas for Phases 2 and 3 will be designed and constructed to prevent contact with storm water from other areas and minimize infiltration of precipitation that lands on the shale pile. The disposal areas will also have drainage features to control runoff. Monitoring of the spent shale disposal areas and runoff areas will be conducted throughout the project. Until the Phase 1 and Phase 2 testing results demonstrate that the spent shale is not a hazardous material, it will be isolated from the environment. The results of the Phase 1 and, if necessary, Phase 2 testing will be used to determine the continued need for an impervious liner to isolate the spent shale from the environment.
- Prior to and during mine dewatering, testing will be performed and water that does not meet water quality standards will be contained and transported for off-site treatment, unless the water can be treated on-site to meet

applicable water quality standards for on-site surface disposal in accordance with all applicable rules, regulations, and/or permits.

- OSEC will develop and implement all necessary plans and engineering measures (e.g., bermed, lined and covered storage areas) to comply with the Resource Conservation and Recovery Act and to properly manage hazardous wastes and oil wastes generated during Phases 2 and 3.
- OSEC will develop and implement a plan for the handling and disposal of construction related wastes at licensed off-site facilities.
- OSEC will dispose of (Phase 2) or treat on-site (Phase 3) any process waters that do not meet water quality standards prior to re-use for moisture control or discharge on the 160-acre lease.
- OSEC will evaluate and upgrade as necessary the on-site sewage treatment facility and treat all sewage waters generated on the 160-acre lease.
- If monitoring shows adverse impacts to soil quality or the potential for adverse impacts to ground water quality beneath the site from the spent shale disposal during Phase 2, OSEC will notify the BLM and implement measures to address any impacts.
- If lighter debris becomes wind-borne and is transported away from the construction area, OSEC will implement measures to collect all such debris and to have it properly disposed of.
- In the event of a spill of sulfur, nitrogen, or spent catalyst wastes, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to remove as much of the discharged material from the environment as possible.
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the response measures.
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that adverse long-term impacts are minimized.
- In the event an accidental release of mine water that does not meet water quality standards, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to pump up as much of the discharged water into tanks as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no adverse long-term impacts remain.

- In the event of an accidental release of water generated during retorting or process washdown operations that does not meet water quality standards, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to pump up as much of the discharged water into tanks as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.
- In the event of an accidental release of waste oils or oily sludges, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to remove as much of the discharged wastes from the spill area as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.
- In the event that a spill of sanitary wastes from a portable unit occurs, the material will be cleaned up, contained as quickly as possible, and moved to an approved disposal facility.
- In the event of an accidental release of untreated or partially treated effluent from the sanitary waste water treatment facility, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the release and to remove as much of the discharged wastes from the spill area as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.

Water Resources and Water Quality

OSEC will obtain necessary federal and state permits, and will comply with the Corps of Engineers Nationwide Permit requirements, if appropriate; Stormwater discharge permit, and all other applicable water quality permitting requirements to

minimize impacts to water quality. OSEC will minimize impacts to water quality, surface and ground, by implementing the following measures:

- OSEC will evaluate and implement measures to reduce, to the extent practicable, water usage for the process. If water is withdrawn from the White River or from the White River alluvium, the monitoring will consist of (1) measuring water withdrawal from the White River and (2) measuring the ground water level in two piezometers located in the alluvium near the withdrawal point(s). If ground water is extracted from the Birds Nest Aquifer, the monitoring will include a piezometer in the Birds Nest Aquifer and a gauging station along Evacuation Creek. It is anticipated that such monitoring would be daily for the first two weeks of water withdrawals, weekly for the next six weeks, and monthly thereafter.
- If the initial water level monitoring indicates that potential impacts could be materially greater than anticipated, OSEC will modify its selected water supply system.
- OSEC will obtain all necessary federal and state permits and will comply with all applicable water-quality permitting requirements to minimize impacts to water quality.
- Develop a groundwater monitoring and response plan and continue the monitoring program as long as needed to determine that the site is acceptable for abandonment.
- Obtain a stormwater discharge permit and submit a stormwater management plan to the BLM authorized officer.
- Prepare and implement a Spill Prevention Control and Countermeasure (SPCC) Plan for BLM approval.
- Submit a water monitoring and response plan to the BLM authorized officer with the Plan of Development.

Soils

- OSEC will develop and implement a soil erosion/sediment control plan to stipulate methods for minimizing soil erosion or sedimentation using appropriate practices, such as maximum allowable slopes, silt fencing or straw wattles.
- OSEC will develop and implement a soil management plan stipulating appropriate practices for the handling, staging, and re-use of topsoil and soil reclamation activities to be conducted following construction, such as soil pile seeding and reclamation requirements.
- Additional soil erosion and sediment control measures and remediation of damaged site soils may be necessary if the applicant-committed measures are found to be inadequate.
- Reseeding may be necessary if the initial application is unsuccessful.

Geology/Energy Production/Mineral Use

- OSEC will coordinate its activities with the oil and gas lessee for the 160-acre lease and lessees along the utility rights-of-way to avoid development conflicts.
- Gilsonite veins will be crossed by the proposed gas pipeline within existing pipeline rights-of-way. OSEC will coordinate construction of utility lines the owner of gilsonite mines crossed by the proposed utility line right-of-way.

Floodplains

- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a minimum depth of three meters below grade. Every effort will be made to conduct all drilling activities associated with the gas pipeline installation within already disturbed areas. Upon completion of this work, reclamation activities will be undertaken to return disturbed areas to pre-construction conditions to the extent possible.
- Upon completion of installation of any new water wells and associated utilities in the floodplain, reclamation activities will be undertaken to return disturbed areas to pre-construction conditions to the extent possible.
- Following a major flood in the White River or a flash flood in an ephemeral stream, damaged utility lines, access roads, and equipment would be repaired and exposed pipe would be reburied. These measures would minimize residual project-related impacts from flooding.

Wetlands/Riparian Areas

- Surveys will be conducted prior to utility construction to establish the presence or absence of wetlands or riparian areas. If wetlands or riparian areas are present, they would be avoided to the extent practicable. If avoidance is not possible, disturbance within the wetland or riparian areas would be minimized to the extent practicable in accordance with any state or federal wetland permitting requirements.
- OSEC will limit construction equipment working in wetlands or riparian areas to that essential for clearing, trench excavation, pipe fabrication and installation, backfilling, and restoration.
- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a minimum depth of three meters below the channel bottom. Every effort will be made to conduct all drilling activities in existing disturbed areas adjacent to Highway 45. The power line will be constructed to span the width of the river with poles located in upland areas.
- OSEC will prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, concrete coating, and refueling activities within 200 feet of any wetland or riparian area.

- Any impacts to wetlands and riparian areas would be minimized by implementing measures to reduce the soil disturbance and enhance restoration of vegetation within wetlands and riparian areas. These mitigation measures may include:
    - Limit construction equipment working in wetlands and riparian zones to that essential for clearing, trench excavation, pipe fabrication and installation, backfilling, and restoration.
    - Limit stump removal, grading, topsoil segregation, and excavation in wetlands and riparian zones to the area immediately over the trench line to avoid excessive disruption of soils and the native seed and rootstock within the soils.
    - Prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, concrete coating, and refueling activities within 200 feet of any wetland or riparian area.
    - Equipment working in wetlands and riparian zones will be cleaned of any possible weed seeds prior to bringing it into these areas.
    - Implement measures to control introduction and spread of invasive, non-native species into wetlands and riparian areas.

Threatened/Endangered Wildlife Species

- Pre-construction clearance surveys will be conducted in the spring prior to construction to identify active bald eagle nests within 1.0 mile of the surface occupancy area and in the winter to identify active bald eagle roosts within 0.5 mile of the project site and utility rights-of-way. Construction activities will not occur within 1.0 mile of any active bald eagle nest without further consultation with the USFWS. Construction activities will not be conducted within 0.5 mile of active roost sites from November 1 through March 31.
- Mitigation solutions such as fencing, flagging, or floatation balls will be thoroughly considered and implemented if necessary at water disposal sites to reduce contamination of wildlife if monitoring results in a conclusion that the water may be toxic.
- The lessee will make a one-time payment which is calculated by multiplying the project's average annual water depletion by the depletion charge in effect at the time the payment is made. The average depletion is estimated at approximately 247 acre-feet per year for the two year test period of Phase 3. If the average depletion is found to be larger than 247 acre-feet per year over this test period, then consultation with USFWS will be reinitiated. The lessee will be required to pay the one-time contribution to the Recovery Program to the USFWS.

Fish and Wildlife Including Special Status Species other than FWS Candidate or Listed Endangered or Threatened Species

- OSEC will conduct clearance surveys, each spring prior to construction, to identify active raptor nests within 0.5 mile of the construction rights-of-way. Construction activities will not be conducted within 0.5 mile of active raptor

nests between February 1 and August 31 or until fledging and dispersal of the young.

- OSEC will conduct clearance surveys each spring prior to construction, to identify presence of any BLM sensitive species. If any BLM sensitive species are found, OSEC will consult with the BLM to determine an appropriate action to reduce impacts.
- If bats are found in the White River Mine, OSEC will install one-way doors or other suitable mitigation at the mine shaft entrances allowing sufficient time prior to re-opening the mine for bats to leave but not to re-enter the mine shafts.

Threatened/Endangered Plant Species

- Following the completion of utility construction, disturbed areas will be reclaimed in a timely manner and in accordance with a project revegetation plan.
- OSEC will conduct clearance surveys each spring prior to construction along the rights-of-way to identify the presence of any T&E plant species.

Vegetation Including Special Status Species other than FWS Candidate or Listed Endangered or Threatened Species

- OSEC will minimize vegetation removal to the extent necessary to allow for safe and efficient construction activities.
- OSEC will develop and implement a revegetation/reclamation plan using appropriate practices to restore disturbed areas to pre-construction conditions to the extent practicable.
- OSEC will conduct clearance surveys each spring prior to construction along the rights-of-way to identify the presence of any BLM sensitive plant species.

Invasive, Non-Native Species

- An invasive, non-native weed management plan, conforming to the requirements of the BLM and local weed management agencies, will be adopted and followed for the project.
- A pesticide use permit will be submitted to and approved by the Authorized Officer prior to implementation of weed control.

Recreation

- The RD&D facility on the 160-acre lease will minimize potential light pollution by limiting the height of light poles and using light shields provided that use of such shields does not affect worker safety.
- OSEC will minimize light and sound pollution at the White River shoreline by use of topographic shielding to ensure that recreational experiences within the Book Cliffs Extensive Recreation Management Area (ERMA) and/or proposed White River Special Recreation Management Area (SRMA) are not diminished.

Visual Resources

- OSEC will develop and implement a plan using appropriate measures to minimize visual impacts from the construction and operations of the facility and utilities in the Project Area, including visual impacts from dust during construction.
- Within all VRM Class II areas, OSEC will construct utility lines within or parallel and adjacent to existing utility rights-of-way.

Cultural Resources

- OSEC will develop and implement standard operating procedures for avoiding historic or archaeological sites in the project, including stop work and notification procedures in the event that such sites are discovered during construction activities, and develop steps to be taken to prevent damage to any such discoveries, consistent with the NHPA and other applicable laws and regulations.
- If any eligible site cannot be avoided by construction, additional work will be conducted to mitigate any adverse impacts as directed by the Authorized Officer. This work may include data recovery by qualified archaeologists prior to construction disturbance or other measures deemed appropriate by the Authorized Officer.
- Even if all eligible surface sites are avoided, it is possible that cultural resources not visible on the surface may be encountered during construction or other project-related activities. In this case, the following measures will be implemented in accordance with the project-specific cultural resources protection plan:
    - Activities will stop in the immediate area of the find, and the Authorized Officer will be immediately contacted. Within five working days, the Authorized Officer will inform OSEC as to (1) whether the materials appear eligible for the NRHP; (2) the mitigation measures OSEC will likely have to undertake before the site can be used (assuming in situ preservation is not practicable); and (3) a timeframe for the Authorized Officer to complete an expedited review under 36 CFR Part 800 to confirm, through the SHPO, that the findings of the BLM Authorized Officer are correct and that mitigation was appropriate.
    - The Authorized Officer will be notified immediately by telephone and with written confirmation, upon discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Activities would stop in the immediate area of the find, and the discovery will be protected for 30 days or until notification in writing by the BLM Authorized Officer to proceed.

Paleontology

- OSEC will develop and implement standard operating procedures for managing the discovery of fossils to minimize damage to scientifically important fossil discoveries, including stop work and notification procedures

in the event that such sites are discovered during construction activities, and develop steps to prevent damage to any such discoveries, consistent with best management practices.

- If suspected fossil materials are uncovered during construction or project operations, the operator will stop work immediately and the Authorized Officer must be contacted. Activities will not resume until the Authorized Officer can assess the situation and advise whether additional mitigation is needed.
- Fossil specimens, if any, recovered during the project that are considered of scientific importance will be curated into the collections of a museum repository acceptable to the BLM.

Special Designation Areas

- OSEC will construct the proposed power line immediately adjacent to the existing power line at the White River crossing to minimize additional impacts to visual resources within potential Special Designation Areas.
- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a depth of three meters below the channel bottom. The crossing will occur at the already disturbed Highway 45 crossing location and every effort will be taken to conduct drilling activities in already-disturbed areas of the floodplain to protect the Outstanding Remarkable Values and scenic classification of the eligible WSR.
- Upon completion of construction, disturbed areas will be restored to preconstruction conditions to the extent practicable in accordance with a project reclamation and revegetation plan.
- Power poles will be located to minimize their view from eligible WSR and ACEC areas.

FORM 2800-14
(August 1985)

Issuing Office
Vernal Field Office

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
RIGHT-OF-WAY GRANT

SERIAL NUMBER UTU-85858

1. A right-of-way is hereby granted pursuant to Title V of the Federal Land Policy and Management Act of October 21, 1976 (90 Stat. 2776; 43 U.S.C. 1761).

2. Nature of Interest:

a. By this instrument, the holder:

Oil Shale Exploration Company, LLC
3601 Spring Hill Business Park, Suite 201
Mobile, Alabama 36608

receives a right to construct, operate, maintain, and terminate eight (8) access roads and one main access gate, on public lands described as follows:

T. 10 S., R. 24 E., SLM, Utah
Sec. 14, SW¼NW¼, W½SW¼;
15, SE¼SW¼;
22, W½NE¼, SE¼NE¼, NE¼NW¼, SE¼SW¼, N½SE¼;
23, N½NW¼, SW¼NW¼.

b. The right-of-way area granted herein is a variable width, 19,300 feet long and contains 17.8 acres, more or less.

c. This instrument shall terminate on December 31, 2026 unless, prior thereto, it is relinquished, abandoned, terminated, or modified pursuant to the terms and conditions of this instrument or of any applicable Federal law or regulation.

d. This instrument may be renewed. If renewed, the right-of-way shall be subject to the regulations existing at the time of renewal and any other terms and conditions that the authorized officer deems necessary to protect the public interest.

e. Notwithstanding the expiration of this instrument or any renewal thereof, early relinquishment, abandonment, or termination, the provisions of this instrument, to the extent applicable, shall continue in effect and shall be binding on the holder, its successors, or assigns, until they have fully satisfied the obligations and/or liabilities accruing herein before or on account of the expiration, or prior termination, of the grant.

3. Rental:

For and in consideration of the rights granted, the holder agrees to pay the Bureau of Land Management fair market value rental as determined by the authorized officer unless specifically exempted from such payment by regulation. Provided, however, that the rental may be adjusted by the authorized officer, whenever necessary, to reflect changes in the fair market rental value as determined by the application of sound business management principles, and so far as practicable and feasible, in accordance with comparable commercial practices. Rental payments, if applicable, should be submitted to the following address:

BLM Vernal Field Office
170 South 500 East
Vernal, Utah 84078

4. Terms and Conditions:

a. This grant is issued subject to the holder's compliance with all applicable regulations contained in Title 43 Code of Federal Regulations part 2800.

b. Upon grant termination by the authorized officer, all improvements shall be removed from the public lands within 90 days, or otherwise disposed of as provided in paragraph (4)(d) or as directed by the authorized officer.

c. Each grant issued for a term of 20 years or more shall, at a minimum, be reviewed by the authorized officer at the end of the 20th year and at regular intervals thereafter not to exceed 10 years. Provided, however, that a right-of-way granted herein may be reviewed at any time deemed necessary by the authorized officer.

d. The stipulations, plans, maps, or designs set forth in Exhibit A, B, and C, dated September 11, 2007, and attached hereto, are incorporated into and made a part of this grant

instrument as fully and effectively as if they were set forth herein in their entirety.

e. Failure of the holder to comply with applicable law or any provision of this right-of-way grant shall constitute grounds for suspension or termination thereof.

f. The holder shall perform all operations in a good and workmanlike manner so as to ensure protection of the environment and the health and safety of the public.

g. The holder shall construct, operate, and maintain the facilities, improvements, and structures within this right-of-way in strict conformity with the plan of development dated September 11, 2007. Any relocation, additional construction, or use that is not in accord with the approved plan of development shall not be initiated without the prior written approval of the authorized officer. Noncompliance with the above will be grounds for an immediate temporary suspension of activities if it constitutes a threat to public health and safety or the environment.

IN WITNESS WHEREOF, The undersigned agrees to the terms and conditions of this right-of-way grant.

(Signature of Holder)	(Signature of Authorized Officer)
(Title)	AFM, Lands & Minerals (Title)
(Date)	(Effective Date of Grant)

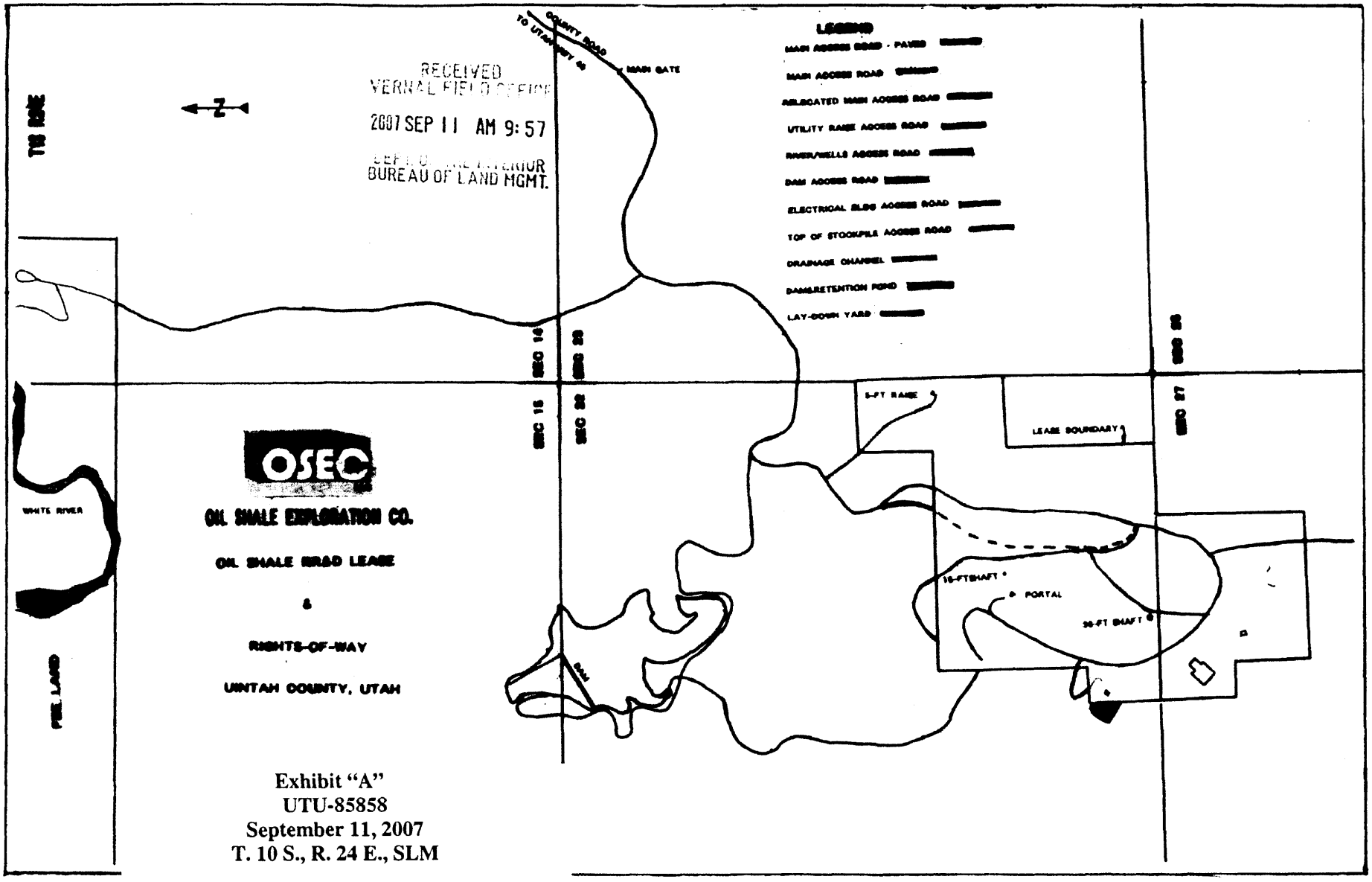

Exhibit "A"
UTU-85858
September 11, 2007
T. 10 S., R. 24 E., SLM

Plan of Development
For
Roads
Oil Shale Exploration Company, LLC
Right-of-Way Application

The right-of-way for the roads included in this application allows access to the RD&D lease and essential support facilities for the 160-acre Oil Shale RD&D Lease.

The existing roads associated with the access, operation and maintenance of the 160-acre Oil Shale RD&D Lease at the White River Mine Site are included in this application. The application is for those portions of the roads outside the boundary of the 160-acre RD&D Lease. The roads are generally graded and graveled, except that the main access road is paved for a distance of about 3,500 feet southwestward from the locked chain-link gate. The chain-link gate is included in the right-of-way for the paved main access road.

The graveled roads will be graded and repaired to correct existing erosion damage; road side drainages and berms will be re-established; and vegetative growth on the roads will be removed. The two small culverts located at the intersection of the Main Access Road and the Utility Raise Access Road that are currently plugged will be replaced with a larger culvert. Other existing culverts will be repaired or replaced as required. Road and culvert work will be according to BLM specifications. Weed and brush control along the roads will be done under a BLM-approved program.

Since the roads included in this application already exist, there are no reasonable alternative routes. Use of the existing roads to support the BLM Oil Shale RD&D Leasing Program will minimize new road construction and new disturbances on public land.

During Phase 3, new construction may be required for 450 feet of the graveled main access road around the proposed spent shale disposal pile. Approval for such construction will be obtained from the BLM prior to construction. The relocated road segment has been included in this right-of-way application.

The roads included in this right-of-way will be used year-round.

Exhibit "B"
UTU-85858
September 11, 2007
T. 10 S., R. 24 E., SLM

The roads requested in this right-of-way are described in the following table.

Road	Construction	Length (ft)	Width (ft)	Area(acres)
Main Access	Paved	3490	40	3.2±
Main Access	Gravel	3300	40	3.0±
River/Well Access	Gravel	4865	40	4.5±
Retention Dam	Gravel	5820	40	5.3±
Utility Raise	Gravel	380	40	0.4±
Top of Stockpile	Gravel	770	40	0.7±
Electrical Building	Gravel	225	40	0.2±
Relocated Main Rd.	Gravel	450	50	~~0.4±~~ .5
Total Area		19,300		~~17.7±~~ 17.8

The term of the right-of-way will be 20 years or until the RD&D lease is relinquished, or until the 4,960-acre preferential commercial lease is issued to the RD&D Lease lessee; in the case of the latter, the right-of-way area will be modified to recognize the new lease boundary.

On-going costs associated with this right-of-way include the replacement of any plugged culverts, grading the gravel roads and any necessary weed and brush control. Weed and brush control requiring the use of herbicides will be done in accordance with a BLM-approved Pesticide Use Proposal. The total cost will be determined at the time materials are purchased.

There should be no new environmental impacts from OSEC using the existing access roads. Environmental effects for the RD&D project were addressed in the BLM RD&D Lease Environmental Assessment.

Any potential effects on plant, fish and animal populations of the area were addressed in the BLM Oil Shale RD&D Lease Environmental Assessment.

The public will benefit if the Oil Shale RD&D Lease effort provides meaningful results leading to a new commercial source of crude oil.

Special Stipulations:

Section 25: The following terms, conditions, stipulations, and other mitigation measures are incorporated in the Proposed Action as outlined in the subject EA, and are comprised of the BLM specifications and guidelines, and the environmental commitments put forth by OSEC. These measures were designed for site-specific mitigation so as to lessen the potential for adverse effects to public lands administered by the BLM Vernal Field Office. These measures will be stipulated, as appropriate, in any Plan of Development approval. Following the BLM approval of a Plan of Development, OSEC will make oil shale available to other entities for oil shale research purposes up to 50% of the existing oil shale stockpiles at minimal cost for loading, and upon reentering the mine up to 5% of the monthly oil shale production sold to a third party. This mined material will be provided to third parties, approved by the BLM, at a price to cover operating costs, which include labor, energy, materials and supplies, local taxes, insurance, lifting and loading, and a rate of return on capital as described in the Office of Management and Budget (OMB) Circular A-94, *Guidelines and Discount Rates for Benefit Cost Analysis of Federal Programs*. Presently, the average real rate of return of 7% is described in OMB Circular A-94, Item Section 8 c(1) and c(3), *Discount Rate Policy.*

In addition, these terms, conditions, stipulations and other mitigation measures will be incorporated, as appropriate, into any right-of-way grant issued under the applicable regulations contained in 43 CFR Part 2800.

Terms/Conditions/Stipulations

Use of White River Oil Shale Mine Facilities

Surface Buildings and Equipment: The lessee may occupy and utilize the buildings and equipment that are on the leased lands. These buildings include the mine administration building, water treatment plant, sewage treatment plant, electrical building, 16-foot diameter shaft fan support building and the hoist with the headframe from the 30-foot diameter shaft. The lessee may, at his own expense refurbish, remodel or update the buildings as necessary for his use. The buildings must be utilized as part of the operation and other uses are not authorized. The buildings may not be sold, rented or leased to other entities. The lessor does not make any guarantees on the buildings structural integrity or usefulness. The lessee may use the buildings at his "own risk"

Underground Facilities: The lessee may occupy and utilize (including ore extraction) the underground facilities (mine). The mine includes all drifts, declines, slopes, rooms, shafts and adits on the site. The condition of the mine is unknown. Hazards such as methane, hydrogen sulfide gas, naturally occurring oil flows and mine water exist. Other hazards may exist such as oxygen deficient air; roof, rib and

Exhibit "C"
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floor failures and others. Prior to any entrance to the mine, plans must be submitted and approved by the Mine Safety, Health Administration, Bureau of Land Management and the Utah Division of Oil, Gas and Mining.

Miscellaneous Facilities: The lessee may occupy and utilize the existing roads, powerlines and helicopter pad and any other improvements on the site.

Disposal/Reclamation: Once the lessee utilizes a structure, equipment, mine facility helicopter pad, road or site, he will be responsible for its disposal, abandonment and site reclamation as approved by the Authorized Officer.

Waste Certification: Upon abandonment of mine sections, transfer of operations, assignment of rights, or relinquishment of the leased area, and prior to reclamation activities, the Lessee must provide certification to the Lessor that during the term of the lease, there have been no reportable quantities of hazardous substances (40 CFR 302.4), or of used oil (Utah State Administrative Code R315-15), discharged, deposited, or released within the leased area, either on the surface or underground. Lessee must also certify that all remedial actions necessary to protect human health and the environment with respect to any such discharges, deposits or releases, either on the surface or underground within the leased area have been taken. In addition, the Lessee must provide to the Lessor a complete list of all hazardous substances and hazardous materials including their Chemical Abstract Services Registry Numbers, as well as the oil and petroleum products used, stored on, or delivered to, the leased area. Such disclosure will be in addition to any other disclosure required by law or agreement.

Hazardous Materials: If there has been a discharge, deposit or release, of hazardous substances, or of used oil, within the leased area prior to the time application is made for the relinquishment of all or a portion of the leased area, the Lessee, at their expense, shall provide to the Authorized Officer, either a Phase II Environmental Site Assessment, including sampling; an American Society for Testing and Materials Environmental Site Assessment (E1527-05; 2005, or latest version), or other equivalent report, (including the requirement of 40 CFR 312), as well as any risk analysis undertaken by Lessee, as determined by the Authorized Officer. Such report shall document existing site conditions. Prior to the submission of the Phase II Environmental Site Assessment, or other report, the Lessee shall provide the Authorized Officer with a proposed Work Plan, including a schedule, for their approval. Upon approval of the Work Plan, the Lessee shall complete the site assessment. To the extent the Authorized Officer determines that further investigation of existing site conditions is necessary prior to relinquishment acceptance, the Lessee shall conduct such investigations.

Indemnification: The Lessee shall indemnify and hold harmless the United States from any and all claims arising out of the lessee's activities and operations under the lease.

In addition to design criteria and mitigation identified in the Proposed Action and the plan of development, the BLM will incorporate, as appropriate, the following mitigation

measures as shown by resource topic. All plans required by the following measures will require approval by the BLM.

Air Quality

OSEC will acquire appropriate air quality permits, comply with permit stipulations, implement emission control measures, and monitor air quality control required by the air quality permitting agency. In addition, OSEC will:

- Avoid roads and other surface construction activities with soils susceptible to wind erosion, as appropriate, to reduce the amount of fugitive dust generated by traffic and other activities.
- Use dust inhibitors to prevent fugitive dust problems. Measures, such as the use of water trucks and moisture control and baghouses, will be implemented to minimize fugitive dust emissions.
- Establish and enforce speed limits on roads where needed to reduce fugitive dust problems.
- Cooperate with atmospheric deposition and visibility impact monitoring programs.
- Mitigate fugitive dust emissions using erosion control measures, and control dust during construction, wind events, and stockpiles, as necessary.
- OSEC will obtain and comply with all necessary air permits and install, operate and maintain air emission control devices on the ATP system during Phase 2 and Phase 3 and on units of the wastewater treatment system and hydrotreatment system during Phase 3. This will include, for Phase 3, Best Available Control Technology (BACT) that complies with the Prevention of Significant Deterioration (PSD) requirements of the Clean Air Act.

Wastes

- The environmental controls to be required for the disposal of spent shale will be approved by the BLM as well as other regulatory authorities as appropriate. The spent shale disposal areas for Phases 2 and 3 will be designed and constructed to prevent contact with storm water from other areas and minimize infiltration of precipitation that lands on the shale pile. The disposal areas will also have drainage features to control runoff. Monitoring of the spent shale disposal areas and runoff areas will be conducted throughout the project. Until the Phase 1 and Phase 2 testing results demonstrate that the spent shale is not a hazardous material, it will be isolated from the environment. The results of the Phase 1 and, if necessary, Phase 2 testing will be used to determine the continued need for an impervious liner to isolate the spent shale from the environment.
- Prior to and during mine dewatering, testing will be performed and water that does not meet water quality standards will be contained and transported for off-site treatment, unless the water can be treated on-site to meet

applicable water quality standards for on-site surface disposal in accordance with all applicable rules, regulations, and/or permits.

- OSEC will develop and implement all necessary plans and engineering measures (e.g., bermed, lined and covered storage areas) to comply with the Resource Conservation and Recovery Act and to properly manage hazardous wastes and oil wastes generated during Phases 2 and 3.
- OSEC will develop and implement a plan for the handling and disposal of construction related wastes at licensed off-site facilities.
- OSEC will dispose of (Phase 2) or treat on-site (Phase 3) any process waters that do not meet water quality standards prior to re-use for moisture control or discharge on the 160-acre lease.
- OSEC will evaluate and upgrade as necessary the on-site sewage treatment facility and treat all sewage waters generated on the 160-acre lease.
- If monitoring shows adverse impacts to soil quality or the potential for adverse impacts to ground water quality beneath the site from the spent shale disposal during Phase 2, OSEC will notify the BLM and implement measures to address any impacts.
- If lighter debris becomes wind-borne and is transported away from the construction area, OSEC will implement measures to collect all such debris and to have it properly disposed of.
- In the event of a spill of sulfur, nitrogen, or spent catalyst wastes, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to remove as much of the discharged material from the environment as possible.
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the response measures.
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that adverse long-term impacts are minimized.
- In the event an accidental release of mine water that does not meet water quality standards, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to pump up as much of the discharged water into tanks as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no adverse long-term impacts remain.

- In the event of an accidental release of water generated during retorting or process washdown operations that does not meet water quality standards, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to pump up as much of the discharged water into tanks as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.
- In the event of an accidental release of waste oils or oily sludges, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to remove as much of the discharged wastes from the spill area as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.
- In the event that a spill of sanitary wastes from a portable unit occurs, the material will be cleaned up, contained as quickly as possible, and moved to an approved disposal facility.
- In the event of an accidental release of untreated or partially treated effluent from the sanitary waste water treatment facility, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the release and to remove as much of the discharged wastes from the spill area as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.

Water Resources and Water Quality

OSEC will obtain necessary federal and state permits, and will comply with the Corps of Engineers Nationwide Permit requirements, if appropriate; Stormwater discharge permit, and all other applicable water quality permitting requirements to

minimize impacts to water quality. OSEC will minimize impacts to water quality, surface and ground, by implementing the following measures:

- OSEC will evaluate and implement measures to reduce, to the extent practicable, water usage for the process. If water is withdrawn from the White River or from the White River alluvium, the monitoring will consist of (1) measuring water withdrawal from the White River and (2) measuring the ground water level in two piezometers located in the alluvium near the withdrawal point(s). If ground water is extracted from the Birds Nest Aquifer, the monitoring will include a piezometer in the Birds Nest Aquifer and a gauging station along Evacuation Creek. It is anticipated that such monitoring would be daily for the first two weeks of water withdrawals, weekly for the next six weeks, and monthly thereafter.
- If the initial water level monitoring indicates that potential impacts could be materially greater than anticipated, OSEC will modify its selected water supply system.
- OSEC will obtain all necessary federal and state permits and will comply with all applicable water-quality permitting requirements to minimize impacts to water quality.
- Develop a groundwater monitoring and response plan and continue the monitoring program as long as needed to determine that the site is acceptable for abandonment.
- Obtain a stormwater discharge permit and submit a stormwater management plan to the BLM authorized officer.
- Prepare and implement a Spill Prevention Control and Countermeasure (SPCC) Plan for BLM approval.
- Submit a water monitoring and response plan to the BLM authorized officer with the Plan of Development.

Soils

- OSEC will develop and implement a soil erosion/sediment control plan to stipulate methods for minimizing soil erosion or sedimentation using appropriate practices, such as maximum allowable slopes, silt fencing or straw wattles.
- OSEC will develop and implement a soil management plan stipulating appropriate practices for the handling, staging, and re-use of topsoil and soil reclamation activities to be conducted following construction, such as soil pile seeding and reclamation requirements.
- Additional soil erosion and sediment control measures and remediation of damaged site soils may be necessary if the applicant-committed measures are found to be inadequate.
- Reseeding may be necessary if the initial application is unsuccessful.

Geology/Energy Production/Mineral Use

- OSEC will coordinate its activities with the oil and gas lessee for the 160-acre lease and lessees along the utility rights-of-way to avoid development conflicts.
- Gilsonite veins will be crossed by the proposed gas pipeline within existing pipeline rights-of-way. OSEC will coordinate construction of utility lines the owner of gilsonite mines crossed by the proposed utility line right-of-way.

Floodplains

- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a minimum depth of three meters below grade. Every effort will be made to conduct all drilling activities associated with the gas pipeline installation within already disturbed areas. Upon completion of this work, reclamation activities will be undertaken to return disturbed areas to pre-construction conditions to the extent possible.
- Upon completion of installation of any new water wells and associated utilities in the floodplain, reclamation activities will be undertaken to return disturbed areas to pre-construction conditions to the extent possible.
- Following a major flood in the White River or a flash flood in an ephemeral stream, damaged utility lines, access roads, and equipment would be repaired and exposed pipe would be reburied. These measures would minimize residual project-related impacts from flooding.

Wetlands/Riparian Areas

- Surveys will be conducted prior to utility construction to establish the presence or absence of wetlands or riparian areas. If wetlands or riparian areas are present, they would be avoided to the extent practicable. If avoidance is not possible, disturbance within the wetland or riparian areas would be minimized to the extent practicable in accordance with any state or federal wetland permitting requirements.
- OSEC will limit construction equipment working in wetlands or riparian areas to that essential for clearing, trench excavation, pipe fabrication and installation, backfilling, and restoration.
- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a minimum depth of three meters below the channel bottom. Every effort will be made to conduct all drilling activities in existing disturbed areas adjacent to Highway 45. The power line will be constructed to span the width of the river with poles located in upland areas.
- OSEC will prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, concrete coating, and refueling activities within 200 feet of any wetland or riparian area.

- Any impacts to wetlands and riparian areas would be minimized by implementing measures to reduce the soil disturbance and enhance restoration of vegetation within wetlands and riparian areas. These mitigation measures may include:
    - Limit construction equipment working in wetlands and riparian zones to that essential for clearing, trench excavation, pipe fabrication and installation, backfilling, and restoration.
    - Limit stump removal, grading, topsoil segregation, and excavation in wetlands and riparian zones to the area immediately over the trench line to avoid excessive disruption of soils and the native seed and rootstock within the soils.
    - Prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, concrete coating, and refueling activities within 200 feet of any wetland or riparian area.
    - Equipment working in wetlands and riparian zones will be cleaned of any possible weed seeds prior to bringing it into these areas.
    - Implement measures to control introduction and spread of invasive, non-native species into wetlands and riparian areas.

Threatened/Endangered Wildlife Species

- Pre-construction clearance surveys will be conducted in the spring prior to construction to identify active bald eagle nests within 1.0 mile of the surface occupancy area and in the winter to identify active bald eagle roosts within 0.5 mile of the project site and utility rights-of-way. Construction activities will not occur within 1.0 mile of any active bald eagle nest without further consultation with the USFWS. Construction activities will not be conducted within 0.5 mile of active roost sites from November 1 through March 31.
- Mitigation solutions such as fencing, flagging, or floatation balls will be thoroughly considered and implemented if necessary at water disposal sites to reduce contamination of wildlife if monitoring results in a conclusion that the water may be toxic.
- The lessee will make a one-time payment which is calculated by multiplying the project's average annual water depletion by the depletion charge in effect at the time the payment is made. The average depletion is estimated at approximately 247 acre-feet per year for the two year test period of Phase 3. If the average depletion is found to be larger than 247 acre-feet per year over this test period, then consultation with USFWS will be reinitiated. The lessee will be required to pay the one-time contribution to the Recovery Program to the USFWS.

Fish and Wildlife Including Special Status Species other than FWS Candidate or Listed Endangered or Threatened Species

- OSEC will conduct clearance surveys, each spring prior to construction, to identify active raptor nests within 0.5 mile of the construction rights-of-way. Construction activities will not be conducted within 0.5 mile of active raptor

nests between February 1 and August 31 or until fledging and dispersal of the young.

- OSEC will conduct clearance surveys each spring prior to construction, to identify presence of any BLM sensitive species. If any BLM sensitive species are found, OSEC will consult with the BLM to determine an appropriate action to reduce impacts.
- If bats are found in the White River Mine, OSEC will install one-way doors or other suitable mitigation at the mine shaft entrances allowing sufficient time prior to re-opening the mine for bats to leave but not to re-enter the mine shafts.

Threatened/Endangered Plant Species

- Following the completion of utility construction, disturbed areas will be reclaimed in a timely manner and in accordance with a project revegetation plan.
- OSEC will conduct clearance surveys each spring prior to construction along the rights-of-way to identify the presence of any T&E plant species.

Vegetation Including Special Status Species other than FWS Candidate or Listed Endangered or Threatened Species

- OSEC will minimize vegetation removal to the extent necessary to allow for safe and efficient construction activities.
- OSEC will develop and implement a revegetation/reclamation plan using appropriate practices to restore disturbed areas to pre-construction conditions to the extent practicable.
- OSEC will conduct clearance surveys each spring prior to construction along the rights-of-way to identify the presence of any BLM sensitive plant species.

Invasive, Non-Native Species

- An invasive, non-native weed management plan, conforming to the requirements of the BLM and local weed management agencies, will be adopted and followed for the project.
- A pesticide use permit will be submitted to and approved by the Authorized Officer prior to implementation of weed control.

Recreation

- The RD&D facility on the 160-acre lease will minimize potential light pollution by limiting the height of light poles and using light shields provided that use of such shields does not affect worker safety.
- OSEC will minimize light and sound pollution at the White River shoreline by use of topographic shielding to ensure that recreational experiences within the Book Cliffs Extensive Recreation Management Area (ERMA) and/or proposed White River Special Recreation Management Area (SRMA) are not diminished.

Visual Resources

- OSEC will develop and implement a plan using appropriate measures to minimize visual impacts from the construction and operations of the facility and utilities in the Project Area, including visual impacts from dust during construction.
- Within all VRM Class II areas, OSEC will construct utility lines within or parallel and adjacent to existing utility rights-of-way.

Cultural Resources

- OSEC will develop and implement standard operating procedures for avoiding historic or archaeological sites in the project, including stop work and notification procedures in the event that such sites are discovered during construction activities, and develop steps to be taken to prevent damage to any such discoveries, consistent with the NHPA and other applicable laws and regulations.
- If any eligible site cannot be avoided by construction, additional work will be conducted to mitigate any adverse impacts as directed by the Authorized Officer. This work may include data recovery by qualified archaeologists prior to construction disturbance or other measures deemed appropriate by the Authorized Officer.
- Even if all eligible surface sites are avoided, it is possible that cultural resources not visible on the surface may be encountered during construction or other project-related activities. In this case, the following measures will be implemented in accordance with the project-specific cultural resources protection plan:
    - Activities will stop in the immediate area of the find, and the Authorized Officer will be immediately contacted. Within five working days, the Authorized Officer will inform OSEC as to (1) whether the materials appear eligible for the NRHP; (2) the mitigation measures OSEC will likely have to undertake before the site can be used (assuming in situ preservation is not practicable); and (3) a timeframe for the Authorized Officer to complete an expedited review under 36 CFR Part 800 to confirm, through the SHPO, that the findings of the BLM Authorized Officer are correct and that mitigation was appropriate.
    - The Authorized Officer will be notified immediately by telephone and with written confirmation, upon discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Activities would stop in the immediate area of the find, and the discovery will be protected for 30 days or until notification in writing by the BLM Authorized Officer to proceed.

Paleontology

- OSEC will develop and implement standard operating procedures for managing the discovery of fossils to minimize damage to scientifically important fossil discoveries, including stop work and notification procedures

in the event that such sites are discovered during construction activities, and develop steps to prevent damage to any such discoveries, consistent with best management practices.

- If suspected fossil materials are uncovered during construction or project operations, the operator will stop work immediately and the Authorized Officer must be contacted. Activities will not resume until the Authorized Officer can assess the situation and advise whether additional mitigation is needed.
- Fossil specimens, if any, recovered during the project that are considered of scientific importance will be curated into the collections of a museum repository acceptable to the BLM.

Special Designation Areas

- OSEC will construct the proposed power line immediately adjacent to the existing power line at the White River crossing to minimize additional impacts to visual resources within potential Special Designation Areas.
- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a depth of three meters below the channel bottom. The crossing will occur at the already disturbed Highway 45 crossing location and every effort will be taken to conduct drilling activities in already-disturbed areas of the floodplain to protect the Outstanding Remarkable Values and scenic classification of the eligible WSR.
- Upon completion of construction, disturbed areas will be restored to preconstruction conditions to the extent practicable in accordance with a project reclamation and revegetation plan.
- Power poles will be located to minimize their view from eligible WSR and ACEC areas.

Special Gate & Lock Stipulation

- OSEC will maintain the existing chain-link gate and fence located at the paved main access road. OSEC will keep the gate and fence repaired and in good operating order. OSEC will coordinate with the Authorized Officer, Bureau of Land Management, to insure that the public that need access beyond the gated entryway can gain entry.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Vernal Field Office
170 South 500 East
Vernal, UT 84078
(435) 781-4400 Fax: (435) 781-4410

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
2800
UTU-85857
UTU-85858
UTU-85859
(U-083)

NOV 29 2007

Oil Shale Exploration Company, LLC
3601 Spring Hill Business Park, Suite 201
~~Denver, CO 80202~~
Mobile, AL 36608

Gentlemen:

Attached are duplicate copies of three (3) right-of-way (ROW) grant offers (BLM Forms 2800-14), serial numbers UTU-85857, UTU-85858 and UTU-85859, for Oil Shale Exploration Company, LLC (OSEC). Please have the Authorized Officer representing OSEC review and sign both copies of each of the offered ROW grant forms. Execution of the attached form implies the holders concurrence to the terms, conditions and stipulations listed therein; consequently, we request you to ensure that the Authorized Officer representing OSEC review the complete form carefully. Please return both copies of each of the three signed and dated ROW grant forms with a copy of this letter to our office at the address listed above.

In accordance with 43 CFR §2804.14 and §2805.16 application processing fees and monitoring fees for each ROW was paid November 23, 2007. Rental for the offered ROW UTU-85857 is based upon a water retention dam/pond site and a drainage channel encompassing an area of 26.9 acres. Rental for the offered ROW UTU-85858 is based upon (8) access roads of a variable width encompassing an area of 17.8 acres. Rental for the offered ROW UTU-85859 is based upon an electrical building lay-down yard encompassing an area of 0.7 acres. Pursuant to 43 CFR §2806.23 OSEC has the option of paying in advance for the entire term of the grants or paying in 10-year intervals, not to exceed the term of the grants. OSEC must submit the rental payments for the grants prior to authorization (see attached Rental Schedules). Optional payment schedules are as follows:

Rental Payment for 10 Years:

UTU-85857	**$1,785.23**
UTU-85858	**$1,177.74**
UTU-85859	**$ 45.60**

Rental Payment for 20 Years:

UTU-85857	**$3,750.63**
UTU-85858	**$2,474.34**
UTU85859	**$ 95.80**

The ROWs will become effective when signed by the Authorized Officer of the BLM. Once we receive the advance rental and the signed and dated ROW grant forms, an approved copy of the ROW grants will be returned to you. The ROWs will be issued subject to the applicable regulations under 43 CFR §2800 and the terms, conditions and stipulations contained in the ROW grants. The ROW grant offers must be executed within 30 days after receipt. If you have any questions regarding this matter, please contact Shauna Derbyshire at 435-781-4435.

Sincerely,

Jerry Kenczka
AFM, Lands & Minerals

Attachments

2806-RIGHTS-OF-WAY MANAGEMENT
Determining CY 2006 1/Rent
Under Rental Schedule

Electric Lines, Telephone Lines, Non-Energy Pipelines and other Linear ROW

USE FOR CALENDAR YEAR 2006 ONLY 1/ **Serial No. UTU-85857**

Date of Determination: November 28, 2007

Determine the 2005(12 months) rent for the R/W by multiplying the number of acres in each appropriate zone by the rental rate for that zone. All rental calculations are rounded to the nearest cents as follows: $97.164 is equal to $97.16: $97.165 is equal to $97.17

Rental Period Date (s): December 1, 2007 thru December 31, 2026

												10 years	20 years	
Zone	length	width	area	divisor	acres		Rate	Annual Rental	part year factor	current year cost	USE	#VALUE!	#VALUE!	
1				43560	0.000		3.51	$0.00	1.0000	$0.00		$0.00	$0.00	
2	5600	210	1176000	43560	26.997		7.28	$196.54	0.0833	$16.37		$1,785.23	$3,750.63	
3			0	43560	0.000		14.05	$0.00	1.0000	$0.00		$0.00	$0.00	
4			0	43560	0.000		21.08	$0.00	1.0000	$0.00		$0.00	$0.00	
5			0	43560	0.000		28.10	$0.00	1.0000	$0.00		$0.00	$0.00	
6			0	43560	0.000		35.12	$0.00	1.0000	$0.00		$0.00	$0.00	
7			0	43560	0.000		42.17	$0.00	1.0000	$0.00		$0.00	$0.00	
8			0	43560	0.000		70.23	$0.00	1.0000	$0.00		$0.00	$0.00	
2			0	43560	0.000			$0.00	1.0000	$0.00		$0.00	$0.00	

1/ May also be used for CY 2007 rent (or length of remaining rental term period) When the CY 2006 rent starts prior to receipt of the updated schedule for CY 2007. Upon receipt of the updated schedule, use the current schedule for the remainder of the current year, and use the updated schedule for the following year (s). (See manual 2801.41E6).

2/ Part year factors are:

12 months 1.0000	9 months 0.7500	6 months 0.5000	3 months 0.2500
11 months 0.9167	8 months 0.6667	5 months 0.4167	2 months 0.1667
10 months .8333	7 months 0.5833	4 months 0.3333	1 months 0.0833

Shauna Derbyshire
Realty Specialist

2806-RIGHTS-OF-WAY MANAGEMENT
Determining CY 2006 1/Rent
Under Rental Schedule

Electric Lines, Telephone Lines, Non-Energy Pipelines and other Linear ROW

USE FOR CALENDAR YEAR 2006 ONLY 1/ **Serial No. UTU-85858**

Date of Determination: November 28, 2007

Determine the 2005(12 months) rent for the R/W by multiplying the number of acres in each appropriate zone by the rental rate for that zone. All rental calculations are rounded to the nearest cents as follows: $97.164 is equal to $97.16: $97.165 is equal to $97.17

Rental Period Date (s): December 1, 2007 thru December 31, 2026

												10 years	20 years	
Zone	length	width	area	divisor	acres		Rate	Annual Rental	part year factor	current year cost	USE	#VALUE!	#VALUE!	
1				43560	0.000		3.51	$0.00	1.0000	$0.00		$0.00	$0.00	
2	19300	40.2	775860	43560	17.811		7.28	$129.66	0.0833	$10.80		$1,177.74	$2,474.34	
3			0	43560	0.000		14.05	$0.00	1.0000	$0.00		$0.00	$0.00	
4			0	43560	0.000		21.08	$0.00	1.0000	$0.00		$0.00	$0.00	
5			0	43560	0.000		28.10	$0.00	1.0000	$0.00		$0.00	$0.00	
6			0	43560	0.000		35.12	$0.00	1.0000	$0.00		$0.00	$0.00	
7			0	43560	0.000		42.17	$0.00	1.0000	$0.00		$0.00	$0.00	
8			0	43560	0.000		70.23	$0.00	1.0000	$0.00		$0.00	$0.00	
2			0	43560	0.000			$0.00	1.0000	$0.00		$0.00	$0.00	

1/ May also be used for CY 2007 rent (or length of remaining rental term period) When the CY 2006 rent starts prior to receipt of the updated schedule for CY 2007. Upon receipt of the updated schedule, use the current schedule for the remainder of the current year, and use the updated schedule for the following year (s). (See manual 2801.41E6).

2/ Part year factors are:

12 months 1.0000	9 months 0.7500	6 months 0.5000	3 months 0.2500
11 months 0.9167	8 months 0.6667	5 months 0.4167	2 months 0.1667
10 months .8333	7 months 0.5833	4 months 0.3333	1 months 0.0833

Shauna Derbyshire
Realty Specialist

2806-RIGHTS-OF-WAY MANAGEMENT
Determining CY 2006 1/Rent
Under Rental Schedule

Electric Lines, Telephone Lines, Non-Energy Pipelines and other Linear ROW

USE FOR CALENDAR YEAR 2006 ONLY 1/ **Serial No. UTU-85859**

Date of Determination: November 28, 2007

Determine the 2005(12 months) rent for the R/W by multiplying the number of acres in each appropriate zone by the rental rate for that zone. All rental calculations are rounded to the nearest cents as follows: $97.164 is equal to $97.16: $97.165 is equal to $97.17

Rental Period Date (s): December 1, 2007 thru December 31, 2026

												10 years	20 years	
Zone	length	width	area	divisor	acres		Rate	Annual Rental	part year factor	current year cost	USE	#VALUE!	#VALUE!	
1				43560	0.000		3.51	$0.00	1.0000	$0.00		$0.00	$0.00	
2	200	150	30000	43560	0.689		7.28	$5.02	0.0833	$0.42		$45.60	$95.80	
3			0	43560	0.000		14.05	$0.00	1.0000	$0.00		$0.00	$0.00	
4			0	43560	0.000		21.08	$0.00	1.0000	$0.00		$0.00	$0.00	
5			0	43560	0.000		28.10	$0.00	1.0000	$0.00		$0.00	$0.00	
6			0	43560	0.000		35.12	$0.00	1.0000	$0.00		$0.00	$0.00	
7			0	43560	0.000		42.17	$0.00	1.0000	$0.00		$0.00	$0.00	
8			0	43560	0.000		70.23	$0.00	1.0000	$0.00		$0.00	$0.00	
2			0	43560	0.000			$0.00	1.0000	$0.00		$0.00	$0.00	

1/ May also be used for CY 2007 rent (or length of remaining rental term period) When the CY 2006 rent starts prior to receipt of the updated schedule for CY 2007. Upon receipt of the updated schedule, use the current schedule for the remainder of the current year, and use the updated schedule for the following year (s). (See manual 2801.41E6).

2/ Part year factors are:

12 months 1.0000
11 months 0.9167
10 months .8333
9 months 0.7500
8 months 0.6667
7 months 0.5833
6 months 0.5000
5 months 0.4167
4 months 0.3333
3 months 0.2500
2 months 0.1667
1 months 0.0833

Shauna Derbyshire
Realty Specialist

FORM 2800-14
(August 1985)

Issuing Office
Vernal Field Office

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
RIGHT-OF-WAY GRANT

SERIAL NUMBER UTU-85859

1. A right-of-way is hereby granted pursuant to Title V of the Federal Land Policy and Management Act of October 21, 1976 (90 Stat. 2776; 43 U.S.C. 1761).

2. Nature of Interest:

   a. By this instrument, the holder:

      Oil Shale Exploration Company, LLC
      3601 Spring Hill Business Park, Suite 201
      Mobile, Alabama 36608

   receives a right to construct, operate, maintain, and terminate an Electrical Building Lay-Down Yard and existing chain link fence for storage, on public lands described as follows:

      T. 10 S., R. 24 E., SLM, Utah
      Sec. 22, SE¼SW¼.

   b. The right-of-way area granted herein is trapezoidal-shaped parcel approximately 150 feet wide, 200 feet long, and contains 0.7 acres, more or less.

   c. This instrument shall terminate on December 31, 2026 unless, prior thereto, it is relinquished, abandoned, terminated, or modified pursuant to the terms and conditions of this instrument or of any applicable Federal law or regulation.

   d. This instrument may be renewed. If renewed, the right-of-way shall be subject to the regulations existing at the time of renewal and any other terms and conditions that the authorized officer deems necessary to protect the public interest.

   e. Notwithstanding the expiration of this instrument or any renewal thereof, early relinquishment, abandonment, or

termination, the provisions of this instrument, to the extent applicable, shall continue in effect and shall be binding on the holder, its successors, or assigns, until they have fully satisfied the obligations and/or liabilities accruing herein before or on account of the expiration, or prior termination, of the grant.

3. Rental:

For and in consideration of the rights granted, the holder agrees to pay the Bureau of Land Management fair market value rental as determined by the authorized officer unless specifically exempted from such payment by regulation. Provided, however, that the rental may be adjusted by the authorized officer, whenever necessary, to reflect changes in the fair market rental value as determined by the application of sound business management principles, and so far as practicable and feasible, in accordance with comparable commercial practices. Rental payments, if applicable, should be submitted to the following address:

BLM Vernal Field Office
170 South 500 East
Vernal, Utah 84078

4. Terms and Conditions:

a. This grant is issued subject to the holder's compliance with all applicable regulations contained in Title 43 Code of Federal Regulations part 2800.

b. Upon grant termination by the authorized officer, all improvements shall be removed from the public lands within 90 days, or otherwise disposed of as provided in paragraph (4)(d) or as directed by the authorized officer.

c. Each grant issued for a term of 20 years or more shall, at a minimum, be reviewed by the authorized officer at the end of the 20th year and at regular intervals thereafter not to exceed 10 years. Provided, however, that a right-of-way granted herein may be reviewed at any time deemed necessary by the authorized officer.

d. The stipulations, plans, maps, or designs set forth in Exhibit A, B, and C, dated September 11, 2007, and attached hereto, are incorporated into and made a part of this grant instrument as fully and effectively as if they were set forth herein in their entirety.

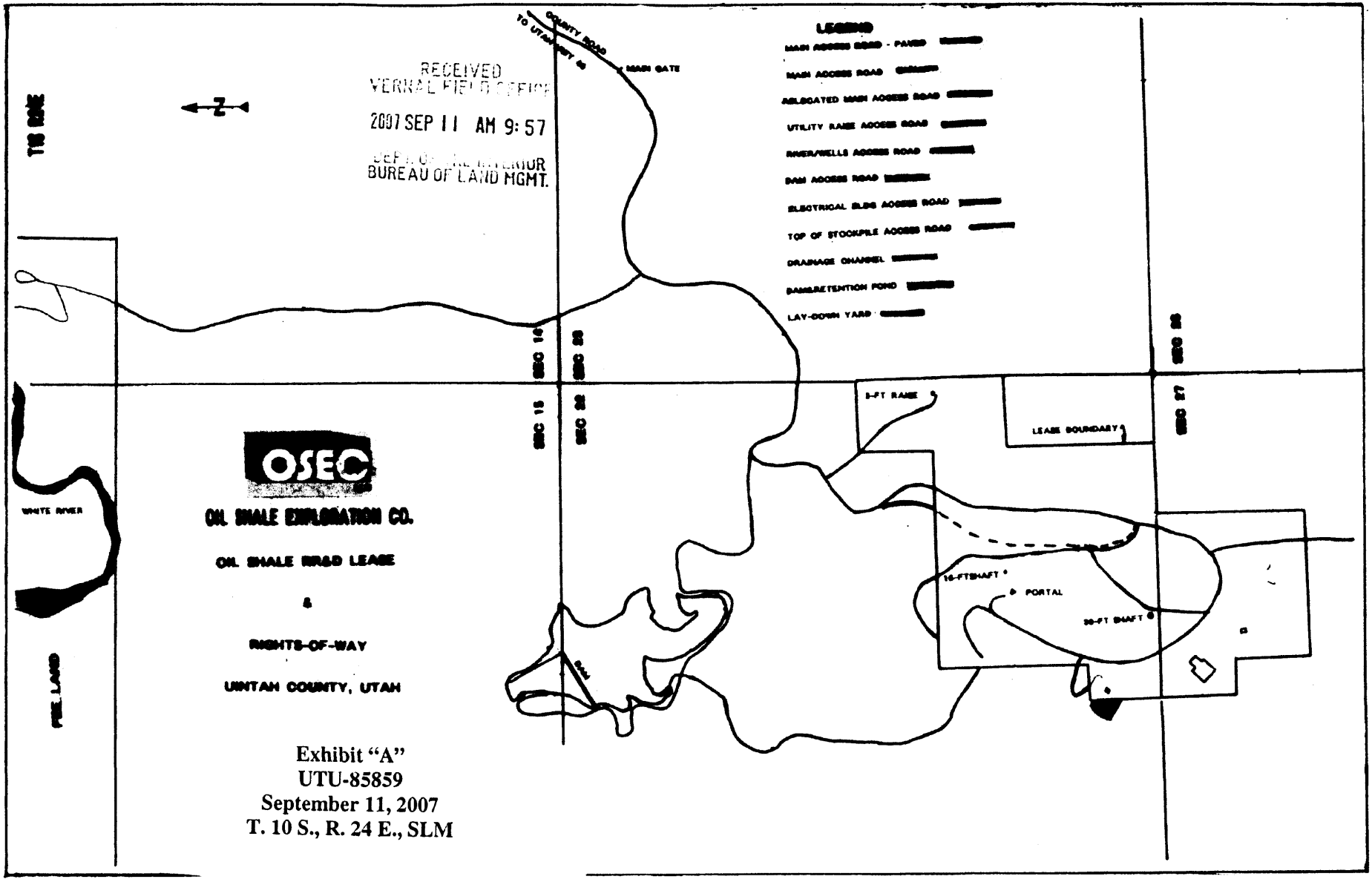
e. Failure of the holder to comply with applicable law or any provision of this right-of-way grant shall constitute grounds for suspension or termination thereof.

f. The holder shall perform all operations in a good and workmanlike manner so as to ensure protection of the environment and the health and safety of the public.

g. The holder shall construct, operate, and maintain the facilities, improvements, and structures within this right-of-way in strict conformity with the plan of development dated September 11, 2007. Any relocation, additional construction, or use that is not in accord with the approved plan of development shall not be initiated without the prior written approval of the authorized officer. Noncompliance with the above will be grounds for an immediate temporary suspension of activities if it constitutes a threat to public health and safety or the environment.

IN WITNESS WHEREOF, The undersigned agrees to the terms and conditions of this right-of-way grant.

(Signature of Holder)	(Signature of Authorized Officer)
(Title)	AFM, Lands & Minerals (Title)
(Date)	(Effective Date of Grant)


RECEIVED
VERNAL FIELD OFFICE
2007 SEP 11 AM 9:57
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MGMT.
T10 S24E
COUNTY ROAD
TO UTAH HWY 45
MAIN GATE
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MAIN ACCESS ROAD - PAVED
MAIN ACCESS ROAD
ABLEGATED MAIN ACCESS ROAD
UTILITY RAISE ACCESS ROAD
RIVER/WELLS ACCESS ROAD
DAM ACCESS ROAD
ELECTRICAL BLDG ACCESS ROAD
TOP OF STOCKPILE ACCESS ROAD
DRAINAGE CHANNEL
DAM/RETENTION POND
LAY-DOWN YARD
SEC 15
SEC 22
SEC 27
8-FT RAISE
LEASE BOUNDARY
16-FT SHAFT
PORTAL
20-FT SHAFT
WHITE RIVER
FEE LAND
OSEC
OIL SHALE EXPLORATION CO.
OIL SHALE R&D LEASE
&
RIGHTS-OF-WAY
UINTAH COUNTY, UTAH
Exhibit "A"
UTU-85859
September 11, 2007
T. 10 S., R. 24 E., SLM

Plan of Development
For
Electrical Building Lay-Down Yard
Oil Shale Exploration Company, LLC
Right-of Way

That portion of the fenced lay-down yard that lies outside the OSEC 160-acre Oil Shale RD&D Lease boundary to the west of the electrical building is included in this right-of-way. The area will be used for equipment and material storage in support of the OSEC oil shale research project. This trapezoidal-shaped parcel contains 0.7 acres, more or less.

The existing 6-foot-high chain link fence surrounding the lay-down area will be left in place and will serve as an outer boundary of the right-of-way.

The right-of-way area has already been leveled, graded and graveled by the previous lessee. The recent growth of weeds and brush will be removed. No other improvements are planed for the area.

This right-of-way will be used year-round.

Term of the right-of-way will be 20 years or until the RD&D lease is relinquished or until the 4960-acre commercial lease is issued; in the case of the latter, the right-of-way will be terminated.

There will be no on-going costs associated with this right-of-way other than weed and brush control. Weed and brush control requiring the use of herbicides will be done in accordance with a BLM-approved Pesticide Use Proposal.

There should be no new environmental impacts from OSEC using the lay-down yard area. Environmental effects of the RD&D project were addressed in the BLM Oil Shale RD&D Lease Environmental Assessment.

The public will benefit if the Oil Shale RD&D Lease effort provides meaningful results leading to a new commercial source of crude oil.

Exhibit "B"
UTU-85859
September 11, 2007
T. 10 S., R. 24 E., SLM

Special Stipulations:

Section 25: The following terms, conditions, stipulations, and other mitigation measures are incorporated in the Proposed Action as outlined in the subject EA, and are comprised of the BLM specifications and guidelines, and the environmental commitments put forth by OSEC. These measures were designed for site-specific mitigation so as to lessen the potential for adverse effects to public lands administered by the BLM Vernal Field Office. These measures will be stipulated, as appropriate, in any Plan of Development approval. Following the BLM approval of a Plan of Development, OSEC will make oil shale available to other entities for oil shale research purposes up to 50% of the existing oil shale stockpiles at minimal cost for loading, and upon reentering the mine up to 5% of the monthly oil shale production sold to a third party. This mined material will be provided to third parties, approved by the BLM, at a price to cover operating costs, which include labor, energy, materials and supplies, local taxes, insurance, lifting and loading, and a rate of return on capital as described in the Office of Management and Budget (OMB) Circular A-94, *Guidelines and Discount Rates for Benefit Cost Analysis of Federal Programs*. Presently, the average real rate of return of 7% is described in OMB Circular A-94, Item Section 8 c(1) and c(3), *Discount Rate Policy*.

In addition, these terms, conditions, stipulations and other mitigation measures will be incorporated, as appropriate, into any right-of-way grant issued under the applicable regulations contained in 43 CFR Part 2800.

Terms/Conditions/Stipulations

Use of White River Oil Shale Mine Facilities

Surface Buildings and Equipment: The lessee may occupy and utilize the buildings and equipment that are on the leased lands. These buildings include the mine administration building, water treatment plant, sewage treatment plant, electrical building, 16-foot diameter shaft fan support building and the hoist with the headframe from the 30-foot diameter shaft. The lessee may, at his own expense refurbish, remodel or update the buildings as necessary for his use. The buildings must be utilized as part of the operation and other uses are not authorized. The buildings may not be sold, rented or leased to other entities. The lessor does not make any guarantees on the buildings structural integrity or usefulness. The lessee may use the buildings at his "own risk"

Underground Facilities: The lessee may occupy and utilize (including ore extraction) the underground facilities (mine). The mine includes all drifts, declines, slopes, rooms, shafts and adits on the site. The condition of the mine is unknown. Hazards such as methane, hydrogen sulfide gas, naturally occurring oil flows and mine water exist. Other hazards may exist such as oxygen deficient air; roof, rib and

floor failures and others. Prior to any entrance to the mine, plans must be submitted and approved by the Mine Safety, Health Administration, Bureau of Land Management and the Utah Division of Oil, Gas and Mining.

Miscellaneous Facilities: The lessee may occupy and utilize the existing roads, powerlines and helicopter pad and any other improvements on the site.

Disposal/Reclamation: Once the lessee utilizes a structure, equipment, mine facility helicopter pad, road or site, he will be responsible for its disposal, abandonment and site reclamation as approved by the Authorized Officer.

Waste Certification: Upon abandonment of mine sections, transfer of operations, assignment of rights, or relinquishment of the leased area, and prior to reclamation activities, the Lessee must provide certification to the Lessor that during the term of the lease, there have been no reportable quantities of hazardous substances (40 CFR 302.4), or of used oil (Utah State Administrative Code R315-15), discharged, deposited, or released within the leased area, either on the surface or underground. Lessee must also certify that all remedial actions necessary to protect human health and the environment with respect to any such discharges, deposits or releases, either on the surface or underground within the leased area have been taken. In addition, the Lessee must provide to the Lessor a complete list of all hazardous substances and hazardous materials including their Chemical Abstract Services Registry Numbers, as well as the oil and petroleum products used, stored on, or delivered to, the leased area. Such disclosure will be in addition to any other disclosure required by law or agreement.

Hazardous Materials: If there has been a discharge, deposit or release, of hazardous substances, or of used oil, within the leased area prior to the time application is made for the relinquishment of all or a portion of the leased area, the Lessee, at their expense, shall provide to the Authorized Officer, either a Phase II Environmental Site Assessment, including sampling; an American Society for Testing and Materials Environmental Site Assessment (E1527-05; 2005, or latest version), or other equivalent report, (including the requirement of 40 CFR 312), as well as any risk analysis undertaken by Lessee, as determined by the Authorized Officer. Such report shall document existing site conditions. Prior to the submission of the Phase II Environmental Site Assessment, or other report, the Lessee shall provide the Authorized Officer with a proposed Work Plan, including a schedule, for their approval. Upon approval of the Work Plan, the Lessee shall complete the site assessment. To the extent the Authorized Officer determines that further investigation of existing site conditions is necessary prior to relinquishment acceptance, the Lessee shall conduct such investigations.

Indemnification: The Lessee shall indemnify and hold harmless the United States from any and all claims arising out of the lessee's activities and operations under the lease.

In addition to design criteria and mitigation identified in the Proposed Action and the plan of development, the BLM will incorporate, as appropriate, the following mitigation

measures as shown by resource topic. All plans required by the following measures will require approval by the BLM.

Air Quality

OSEC will acquire appropriate air quality permits, comply with permit stipulations, implement emission control measures, and monitor air quality control required by the air quality permitting agency. In addition, OSEC will:

- Avoid roads and other surface construction activities with soils susceptible to wind erosion, as appropriate, to reduce the amount of fugitive dust generated by traffic and other activities.
- Use dust inhibitors to prevent fugitive dust problems. Measures, such as the use of water trucks and moisture control and baghouses, will be implemented to minimize fugitive dust emissions.
- Establish and enforce speed limits on roads where needed to reduce fugitive dust problems.
- Cooperate with atmospheric deposition and visibility impact monitoring programs.
- Mitigate fugitive dust emissions using erosion control measures, and control dust during construction, wind events, and stockpiles, as necessary.
- OSEC will obtain and comply with all necessary air permits and install, operate and maintain air emission control devices on the ATP system during Phase 2 and Phase 3 and on units of the wastewater treatment system and hydrotreatment system during Phase 3. This will include, for Phase 3, Best Available Control Technology (BACT) that complies with the Prevention of Significant Deterioration (PSD) requirements of the Clean Air Act.

Wastes

- The environmental controls to be required for the disposal of spent shale will be approved by the BLM as well as other regulatory authorities as appropriate. The spent shale disposal areas for Phases 2 and 3 will be designed and constructed to prevent contact with storm water from other areas and minimize infiltration of precipitation that lands on the shale pile. The disposal areas will also have drainage features to control runoff. Monitoring of the spent shale disposal areas and runoff areas will be conducted throughout the project. Until the Phase 1 and Phase 2 testing results demonstrate that the spent shale is not a hazardous material, it will be isolated from the environment. The results of the Phase 1 and, if necessary, Phase 2 testing will be used to determine the continued need for an impervious liner to isolate the spent shale from the environment.
- Prior to and during mine dewatering, testing will be performed and water that does not meet water quality standards will be contained and transported for off-site treatment, unless the water can be treated on-site to meet

applicable water quality standards for on-site surface disposal in accordance with all applicable rules, regulations, and/or permits.

- OSEC will develop and implement all necessary plans and engineering measures (e.g., bermed, lined and covered storage areas) to comply with the Resource Conservation and Recovery Act and to properly manage hazardous wastes and oil wastes generated during Phases 2 and 3.
- OSEC will develop and implement a plan for the handling and disposal of construction related wastes at licensed off-site facilities.
- OSEC will dispose of (Phase 2) or treat on-site (Phase 3) any process waters that do not meet water quality standards prior to re-use for moisture control or discharge on the 160-acre lease.
- OSEC will evaluate and upgrade as necessary the on-site sewage treatment facility and treat all sewage waters generated on the 160-acre lease.
- If monitoring shows adverse impacts to soil quality or the potential for adverse impacts to ground water quality beneath the site from the spent shale disposal during Phase 2, OSEC will notify the BLM and implement measures to address any impacts.
- If lighter debris becomes wind-borne and is transported away from the construction area, OSEC will implement measures to collect all such debris and to have it properly disposed of.
- In the event of a spill of sulfur, nitrogen, or spent catalyst wastes, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to remove as much of the discharged material from the environment as possible.
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the response measures.
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that adverse long-term impacts are minimized.
- In the event an accidental release of mine water that does not meet water quality standards, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to pump up as much of the discharged water into tanks as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no adverse long-term impacts remain.

- In the event of an accidental release of water generated during retorting or process washdown operations that does not meet water quality standards, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to pump up as much of the discharged water into tanks as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.
- In the event of an accidental release of waste oils or oily sludges, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the spill and to remove as much of the discharged wastes from the spill area as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.
- In the event that a spill of sanitary wastes from a portable unit occurs, the material will be cleaned up, contained as quickly as possible, and moved to an approved disposal facility.
- In the event of an accidental release of untreated or partially treated effluent from the sanitary waste water treatment facility, the following mitigation measures will be implemented:
    - Immediate response actions will be taken to contain the release and to remove as much of the discharged wastes from the spill area as possible;
    - Investigations will be undertaken to determine the extent and magnitude of impacts to the environment following the initial response measures; and
    - Working with regulatory agencies, OSEC will develop a remediation plan to cleanup affected media to acceptable levels such that no unacceptable adverse long-term impacts remain.

Water Resources and Water Quality

OSEC will obtain necessary federal and state permits, and will comply with the Corps of Engineers Nationwide Permit requirements, if appropriate; Stormwater discharge permit, and all other applicable water quality permitting requirements to

minimize impacts to water quality. OSEC will minimize impacts to water quality, surface and ground, by implementing the following measures:

- OSEC will evaluate and implement measures to reduce, to the extent practicable, water usage for the process. If water is withdrawn from the White River or from the White River alluvium, the monitoring will consist of (1) measuring water withdrawal from the White River and (2) measuring the ground water level in two piezometers located in the alluvium near the withdrawal point(s). If ground water is extracted from the Birds Nest Aquifer, the monitoring will include a piezometer in the Birds Nest Aquifer and a gauging station along Evacuation Creek. It is anticipated that such monitoring would be daily for the first two weeks of water withdrawals, weekly for the next six weeks, and monthly thereafter.
- If the initial water level monitoring indicates that potential impacts could be materially greater than anticipated, OSEC will modify its selected water supply system.
- OSEC will obtain all necessary federal and state permits and will comply with all applicable water-quality permitting requirements to minimize impacts to water quality.
- Develop a groundwater monitoring and response plan and continue the monitoring program as long as needed to determine that the site is acceptable for abandonment.
- Obtain a stormwater discharge permit and submit a stormwater management plan to the BLM authorized officer.
- Prepare and implement a Spill Prevention Control and Countermeasure (SPCC) Plan for BLM approval.
- Submit a water monitoring and response plan to the BLM authorized officer with the Plan of Development.

Soils

- OSEC will develop and implement a soil erosion/sediment control plan to stipulate methods for minimizing soil erosion or sedimentation using appropriate practices, such as maximum allowable slopes, silt fencing or straw wattles.
- OSEC will develop and implement a soil management plan stipulating appropriate practices for the handling, staging, and re-use of topsoil and soil reclamation activities to be conducted following construction, such as soil pile seeding and reclamation requirements.
- Additional soil erosion and sediment control measures and remediation of damaged site soils may be necessary if the applicant-committed measures are found to be inadequate.
- Reseeding may be necessary if the initial application is unsuccessful.

Geology/Energy Production/Mineral Use

- OSEC will coordinate its activities with the oil and gas lessee for the 160-acre lease and lessees along the utility rights-of-way to avoid development conflicts.
- Gilsonite veins will be crossed by the proposed gas pipeline within existing pipeline rights-of-way. OSEC will coordinate construction of utility lines the owner of gilsonite mines crossed by the proposed utility line right-of-way.

Floodplains

- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a minimum depth of three meters below grade. Every effort will be made to conduct all drilling activities associated with the gas pipeline installation within already disturbed areas. Upon completion of this work, reclamation activities will be undertaken to return disturbed areas to pre-construction conditions to the extent possible.
- Upon completion of installation of any new water wells and associated utilities in the floodplain, reclamation activities will be undertaken to return disturbed areas to pre-construction conditions to the extent possible.
- Following a major flood in the White River or a flash flood in an ephemeral stream, damaged utility lines, access roads, and equipment would be repaired and exposed pipe would be reburied. These measures would minimize residual project-related impacts from flooding.

Wetlands/Riparian Areas

- Surveys will be conducted prior to utility construction to establish the presence or absence of wetlands or riparian areas. If wetlands or riparian areas are present, they would be avoided to the extent practicable. If avoidance is not possible, disturbance within the wetland or riparian areas would be minimized to the extent practicable in accordance with any state or federal wetland permitting requirements.
- OSEC will limit construction equipment working in wetlands or riparian areas to that essential for clearing, trench excavation, pipe fabrication and installation, backfilling, and restoration.
- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a minimum depth of three meters below the channel bottom. Every effort will be made to conduct all drilling activities in existing disturbed areas adjacent to Highway 45. The power line will be constructed to span the width of the river with poles located in upland areas.
- OSEC will prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, concrete coating, and refueling activities within 200 feet of any wetland or riparian area.

- Any impacts to wetlands and riparian areas would be minimized by implementing measures to reduce the soil disturbance and enhance restoration of vegetation within wetlands and riparian areas. These mitigation measures may include:
    - Limit construction equipment working in wetlands and riparian zones to that essential for clearing, trench excavation, pipe fabrication and installation, backfilling, and restoration.
    - Limit stump removal, grading, topsoil segregation, and excavation in wetlands and riparian zones to the area immediately over the trench line to avoid excessive disruption of soils and the native seed and rootstock within the soils.
    - Prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, concrete coating, and refueling activities within 200 feet of any wetland or riparian area.
    - Equipment working in wetlands and riparian zones will be cleaned of any possible weed seeds prior to bringing it into these areas.
    - Implement measures to control introduction and spread of invasive, non-native species into wetlands and riparian areas.

Threatened/Endangered Wildlife Species

- Pre-construction clearance surveys will be conducted in the spring prior to construction to identify active bald eagle nests within 1.0 mile of the surface occupancy area and in the winter to identify active bald eagle roosts within 0.5 mile of the project site and utility rights-of-way. Construction activities will not occur within 1.0 mile of any active bald eagle nest without further consultation with the USFWS. Construction activities will not be conducted within 0.5 mile of active roost sites from November 1 through March 31.
- Mitigation solutions such as fencing, flagging, or floatation balls will be thoroughly considered and implemented if necessary at water disposal sites to reduce contamination of wildlife if monitoring results in a conclusion that the water may be toxic.
- The lessee will make a one-time payment which is calculated by multiplying the project's average annual water depletion by the depletion charge in effect at the time the payment is made. The average depletion is estimated at approximately 247 acre-feet per year for the two year test period of Phase 3. If the average depletion is found to be larger than 247 acre-feet per year over this test period, then consultation with USFWS will be reinitiated. The lessee will be required to pay the one-time contribution to the Recovery Program to the USFWS.

Fish and Wildlife Including Special Status Species other than FWS Candidate or Listed Endangered or Threatened Species

- OSEC will conduct clearance surveys, each spring prior to construction, to identify active raptor nests within 0.5 mile of the construction rights-of-way. Construction activities will not be conducted within 0.5 mile of active raptor

nests between February 1 and August 31 or until fledging and dispersal of the young.

- OSEC will conduct clearance surveys each spring prior to construction, to identify presence of any BLM sensitive species. If any BLM sensitive species are found, OSEC will consult with the BLM to determine an appropriate action to reduce impacts.
- If bats are found in the White River Mine, OSEC will install one-way doors or other suitable mitigation at the mine shaft entrances allowing sufficient time prior to re-opening the mine for bats to leave but not to re-enter the mine shafts.

Threatened/Endangered Plant Species

- Following the completion of utility construction, disturbed areas will be reclaimed in a timely manner and in accordance with a project revegetation plan.
- OSEC will conduct clearance surveys each spring prior to construction along the rights-of-way to identify the presence of any T&E plant species.

Vegetation Including Special Status Species other than FWS Candidate or Listed Endangered or Threatened Species

- OSEC will minimize vegetation removal to the extent necessary to allow for safe and efficient construction activities.
- OSEC will develop and implement a revegetation/reclamation plan using appropriate practices to restore disturbed areas to pre-construction conditions to the extent practicable.
- OSEC will conduct clearance surveys each spring prior to construction along the rights-of-way to identify the presence of any BLM sensitive plant species.

Invasive, Non-Native Species

- An invasive, non-native weed management plan, conforming to the requirements of the BLM and local weed management agencies, will be adopted and followed for the project.
- A pesticide use permit will be submitted to and approved by the Authorized Officer prior to implementation of weed control.

Recreation

- The RD&D facility on the 160-acre lease will minimize potential light pollution by limiting the height of light poles and using light shields provided that use of such shields does not affect worker safety.
- OSEC will minimize light and sound pollution at the White River shoreline by use of topographic shielding to ensure that recreational experiences within the Book Cliffs Extensive Recreation Management Area (ERMA) and/or proposed White River Special Recreation Management Area (SRMA) are not diminished.

Visual Resources

- OSEC will develop and implement a plan using appropriate measures to minimize visual impacts from the construction and operations of the facility and utilities in the Project Area, including visual impacts from dust during construction.
- Within all VRM Class II areas, OSEC will construct utility lines within or parallel and adjacent to existing utility rights-of-way.

Cultural Resources

- OSEC will develop and implement standard operating procedures for avoiding historic or archaeological sites in the project, including stop work and notification procedures in the event that such sites are discovered during construction activities, and develop steps to be taken to prevent damage to any such discoveries, consistent with the NHPA and other applicable laws and regulations.
- If any eligible site cannot be avoided by construction, additional work will be conducted to mitigate any adverse impacts as directed by the Authorized Officer. This work may include data recovery by qualified archaeologists prior to construction disturbance or other measures deemed appropriate by the Authorized Officer.
- Even if all eligible surface sites are avoided, it is possible that cultural resources not visible on the surface may be encountered during construction or other project-related activities. In this case, the following measures will be implemented in accordance with the project-specific cultural resources protection plan:
    - Activities will stop in the immediate area of the find, and the Authorized Officer will be immediately contacted. Within five working days, the Authorized Officer will inform OSEC as to (1) whether the materials appear eligible for the NRHP; (2) the mitigation measures OSEC will likely have to undertake before the site can be used (assuming in situ preservation is not practicable); and (3) a timeframe for the Authorized Officer to complete an expedited review under 36 CFR Part 800 to confirm, through the SHPO, that the findings of the BLM Authorized Officer are correct and that mitigation was appropriate.
    - The Authorized Officer will be notified immediately by telephone and with written confirmation, upon discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Activities would stop in the immediate area of the find, and the discovery will be protected for 30 days or until notification in writing by the BLM Authorized Officer to proceed.

Paleontology

- OSEC will develop and implement standard operating procedures for managing the discovery of fossils to minimize damage to scientifically important fossil discoveries, including stop work and notification procedures

in the event that such sites are discovered during construction activities, and develop steps to prevent damage to any such discoveries, consistent with best management practices.

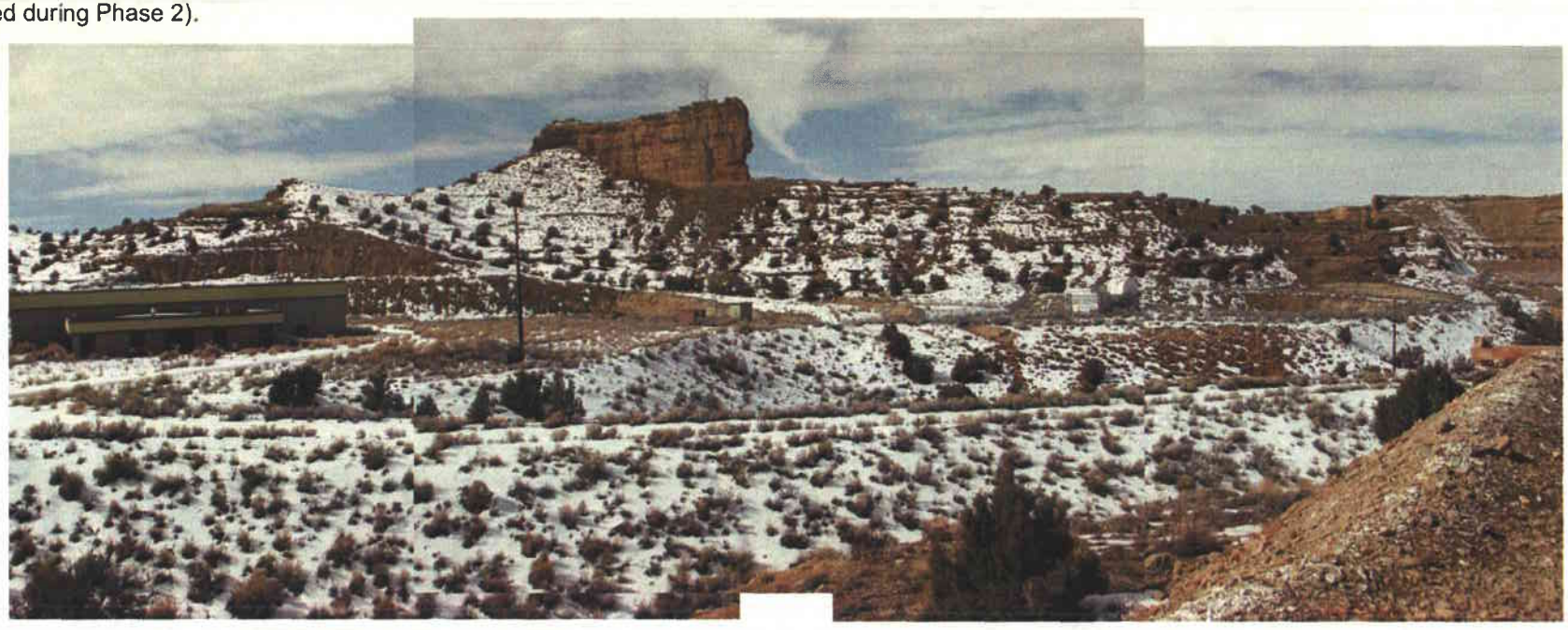
- If suspected fossil materials are uncovered during construction or project operations, the operator will stop work immediately and the Authorized Officer must be contacted. Activities will not resume until the Authorized Officer can assess the situation and advise whether additional mitigation is needed.
- Fossil specimens, if any, recovered during the project that are considered of scientific importance will be curated into the collections of a museum repository acceptable to the BLM.

Special Designation Areas

- OSEC will construct the proposed power line immediately adjacent to the existing power line at the White River crossing to minimize additional impacts to visual resources within potential Special Designation Areas.
- Horizontal directional drilling techniques will be used to install the natural gas pipeline beneath the channel of the White River at a depth of three meters below the channel bottom. The crossing will occur at the already disturbed Highway 45 crossing location and every effort will be taken to conduct drilling activities in already-disturbed areas of the floodplain to protect the Outstanding Remarkable Values and scenic classification of the eligible WSR.
- Upon completion of construction, disturbed areas will be restored to preconstruction conditions to the extent practicable in accordance with a project reclamation and revegetation plan.
- Power poles will be located to minimize their view from eligible WSR and ACEC areas.

Appendix B
Photographs Showing Current Site Conditions

Photo panorama1, above: Looking south from the main shaft area at water treatment tanks and office/shop building. These structures would not be used during Phase 2. Photo panorama 2, below: Looking southwest at office/shop buildings to the silver building, tank, and small pond designed for sewage treatment (not used during Phase 2).



OSEC Oil Shale Mine Site. Photos taken February 15, 2007 by M. Sawyer, JBR Environmental Consultants.

Photo 3: *Close-up looking south of topsoil stockpile below red arrow, and water tanks and office/shop below yellow arrow.*
OSEC Oil Shale Mine Site. Photos taken February 15, 2007 by M. Sawyer, JBR Environmental Consultants.

Photo 4: Looking SSW at sewer pond (not used or occupied during Phase 2) located just north of office/shop building.
OSEC Oil Shale Mine Site. Photos taken February 15, 2007 by M. Sawyer, JBR Environmental Consultants.

Photos 5 & 6: Backfilled portal entry, upper left. Portal staging apron and ore and fill material from portal, lower right.

OSEC Oil Shale Mine Site.
Photos taken February 15, 2007
by M. Sawyer, JBR Environmental Consultants.

Photo 7: The 30-foot shaft is open but surrounded by fencing. Power for hoist came from substation (not used during Phase 2) located to left edge of photo.
OSEC Oil Shale Mine Site. Photos taken February 15, 2007 by M. Sawyer, JBR Environmental Consultants.

Photo 8, left: Looking southwest at headframe for 30-ft shaft, which is still on site.
Photo 9, below: Looking southeastward at hoist for 30-ft. shaft is also on site.

OSEC Oil Shale Mine Site.
Photos taken February 15, 2007
by M. Sawyer, JBR Environmental Consultants.

Photo 10, left: Looking northwestward. The 16-ft. shaft has been capped but has a vent and fencing around it.

Photo 11, below: Looking northwestward. The electric power shack for the vent, used during previous operations. The equipment inside is in reasonable condition, but the shack is inhabited by pack rats. This would not be used during Phase 2.

OSEC Oil Shale Mine Site.
Photos taken February 15, 2007
by M. Sawyer, JBR Environmental Consultants.

Photo 12: Looking northward at vegetation growing on graveled surface in area of 30-ft. and 16-ft. shaft.
OSEC Oil Shale Mine Site. Photos taken February 15, 2007 by M. Sawyer, JBR Environmental Consultants.

Photos 13 and 14: Looking northward from the edge of the plateau on which the 16-ft. shaft is located. This shows the drainage that would receive run-off from the mine camp, retort plant and decline portal areas. Match point for photos is shown at the red arrows.

The natural path of the main drainage in this photo arcs from lower left to upper right and back to the left and out of the photo, as shown by the blue dotted line. The powerline visible in the upper photo drops off the plateau to feed the decline portal. It comes from the plateau on which the 30-ft. and 16-ft. shafts are located.

OSEC Oil Shale Mine Site.
Photos taken February 15, 2007
by M. Sawyer, JBR Environmental Consultants.

Photo 15: Looking southeastward at elevated mine office/shop access road. In Phase 2 of the project spent shale would be placed in the small valley roughly in the area indicated with the dashed red line.

OSEC Oil Shale Mine Site. Photos taken February 15, 2007 by M. Sawyer, JBR Environmental Consultants.

Photo 16: Looking North-northeastward from same location as shown in photo 15. Access road to office/shop area is visible. If exploratory mining continues to Phase 3, most of the valley area covered by sagebrush in this photo would be used for spent shale disposal.
OSEC Oil Shale Mine Site. Photos taken February 15, 2007 by M. Sawyer, JBR Environmental Consultants.

Photo panorama 17: Looking southeast at drainage control pond located upstream of the office/shop building and area. The tanks were for water treatment and are also visible in photos 1 and 3; they would not be used during Phase 2. **OSEC Oil Shale Mine Site. Photos taken February 15, 2007 by M. Sawyer, JBR Environmental Consultants.**

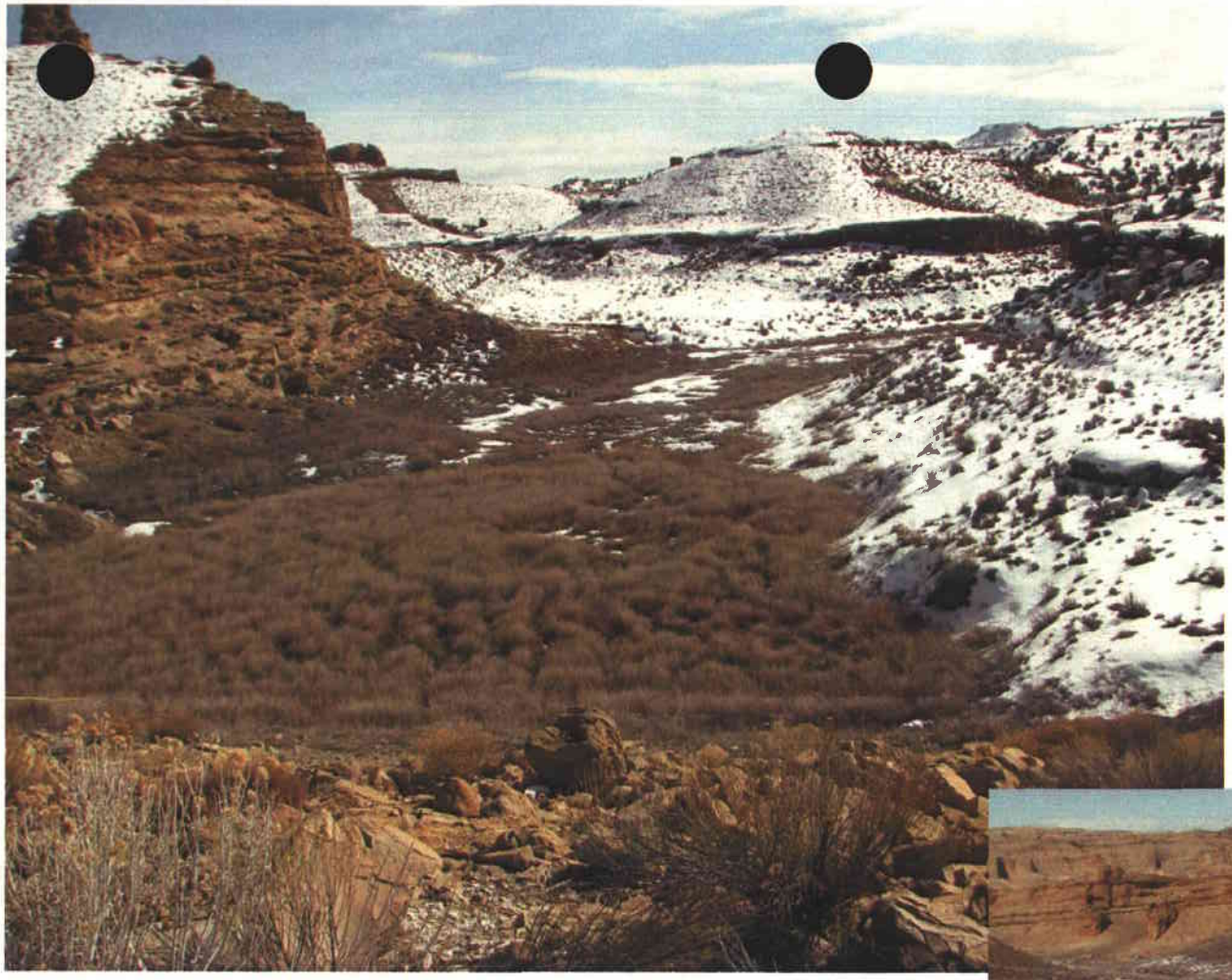
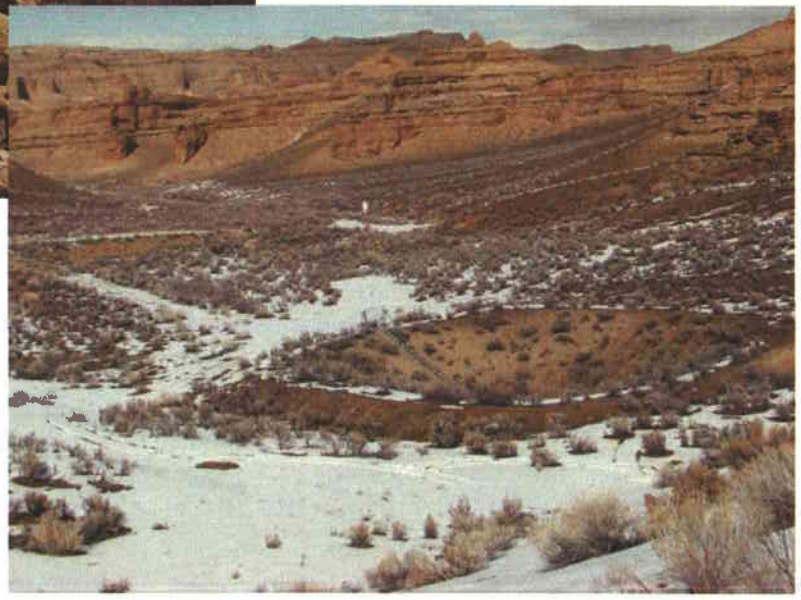


Photo 18: Looking southward at large terminal sediment pond located downstream of all structures. There was no evidence that run-off from the mine has ever reached this pond.

Photo 19, below: The depression shown here is a seepage pond designed to capture any run-off seeping through or below the dam shown in Photo 17, allowing sampling of this liquid. It, too, showed no sign of run-off or any seepage collecting in it.



OSEC Oil Shale Mine Site.
Photos taken February 15, 2007
by M. Sawyer, JBR Environmental Consultants.

Appendix C
Sampling and Monitoring Plans

Shale Sampling Plan
(will be inserted here when available)

Spent Shale Disposal Facility Research Plan
(will be inserted here when available)

Water Monitoring Plan
(will be inserted here when available)

Air Monitoring Plan
(will be inserted here when available)

Appendix D
Safety Plans and MSHA Information

HS&E Plan
(will be inserted here when available)

MSHA Plans and Approvals
(will be inserted here when available)

Appendix E
Sampling and Monitoring Results

Summary of Mine Water Sampling
RD&D Program
While River Oil Shale Mine

MWH

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May 5, 2008

Mr. Gary Aho
Sage Geotech Inc.
P.O. Box 2111
818Taughenbaugh Blvd, Suite 105
Rifle, CO 81650

RE: Summary of Mine Water Sampling
RD&D Program
White River Oil Shale Mine

Dear Mr. Aho:

MWH Americas, Inc. (MWH) is pleased to submit this summary of the sampling and analyses performed on mine water collected as part of Phase 2 of the Research Development and Demonstration Program at the White River Mine Site. Two mine water samples were collected from the White River Mine through the 30 ft mine shaft using a sampling bailer. The samples were analyzed for volatile organic compounds (VOCs), acid-base neutral extractable organics, PP metals, cyanide, total phenols, ammonia, Kleldahl nitrogen, nitrate, sulfate, oil and grease, phosphorus, total dissolved solids, total suspended solids, hardness, pH, and hardness. The results of the mine water samples will be used in the development of a National Pollutant Discharge Elimination System (NPDES) permit application. This letter report is meant to only summarize the analytes that were detected in the two samples. Refer to the complete ACZ Laboratory Report for results of quality control analyses and result qualifiers.

Summary of Results

A summary of the results of the detected analytes and a comparison with various regulatory criteria are provided in Table 1. Analytes that were not detected above their minimum detection limit (MDL) are not included in Table 1. Refer to the complete ACZ Laboratory report for MDLs of all analytes.

Table 1 Summary of Detected Analytes

Analyte	LABID (Sample Number)		Drinking Water Standards		Surface Water Quality Criteria for WhiteRiver	
	L68096-01	L68096-02	Federal MCLs	Domestic 1C	REC 2B	Aquatic 3B
Metals (mg/L)						
Antimony, total	0.002	0.002	0.006	0.006		
Arsenic, dissolved	0.111	0.113				
Arsenic, total	0.109	0.112	0.01	0.01		150

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Beryllium, total	0.0001	ND	0.004	0.004		
Cadmium, dissolved	0.0012	0.0011				
Cadmium, total	0.0013	0.0012	0.005	0.005		0.25
Calcium, dissolved	4.5	4.5				
Chromium, total	0.18	0.18	0.1	0.05	11.0	0.1
Copper, dissolved	0.07	ND				
Copper, total	0.08	ND	1			9.0
Lead, total	0.0002	0.0001	0.015	0.015		2.5
Magnesium, dissolved	4.2	4.2				
Selenium, dissolved	0.0015	0.0019				
Selenium, total	0.0024	0.0014	0.05	0.05	4.6	0.05
Silver, dissolved	0.0003	ND				
Silver, total	0.00024	0.00025	0.1	0.05		1.6
Thallium, total	0.0003	0.0001	0.002	0.002		
Volatile Organic Compounds (µg/L)						
1,3-Dichlorobenzene	5	9				
2,4,6-Trichlorophenol	2	3				
2-Butanone	ND	10				
Acenaphthylene	2	3				
Benzoic acid	10	ND				
Naphthalene	4	5				
Tetrachloroethene	35	30	5			
Toluene	4	7	1000	1000		
Trichloroethene	85	76	5			
Organic Analysis (mg/L)						
Oil and Grease	3	3				
Wet Chemistry (mg/L)						
Cyanide, total	0.005	ND	2.4	2.4		
Hardness as CaCO3	29	29				
Nitrate as N, dissolved	0.02	ND	10			
Nitrate/Nitrite as N, dissolve	0.02	ND	10			
Nitrogen, ammonia	1.97	2.16				
Nitrogen, total Kjeldahl	6.8	6.8				
Phenol	0.061	ND				
Phosphorus, total	0.79	0.82				
Residue, Filterable (TDS) @180	6520	6540	500	500		
Residue, Non-	8	ND				

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Filterable (TSS)						
Sulfate	880	850				

[1/]Non Detect

All analyte detections were similar to those from samples collected from the BLM. As shown on Table 1, arsenic, chromium, tetrachloroethene, trichloroethene, and TDS exceeded one or more of the regulatory standards. However, these standards were only used for comparison purposes and therefore there exceedence does not eliminate the possibility of obtaining an NPDES discharge permit for the water. Once Environ has completed the application for the NPDES permit , MWH will have a better feeling of whether treatment of the mine water will be required If treatment is necessary, MWH will provide possible alternatives for treating the mine water.

We appreciate the opportunity to serve OSEC and Sage Geotech Inc. If you have any questions during your review, please feel free to contact Pat Corser (303-588-9828) or Chad Tomlinson (801-617-3390) at your convenience.

Regards,
MWH

Patrick Corser, P.E.
Principal

Chad Tomlinson, P.E.
Project Manager

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Additional Sampling and Monitoring Results
(will be inserted here when available)

Appendix F
Environmental Plans

SPCC Plan
(will be inserted here when available)

Stormwater Management Plan
(will be inserted here when available)

Weed Management Plan
(will be inserted here when available)

Appendix G
Hydrologic Design Information

Spent Shale Disposal Pile
Storm Water Detention Pond
&
Storm Water Diversions
Design Information

Excerpted from:

MWH 2007. Research, Development and Demonstration Program, White River Oil Shale Mine, Spent Shale Pile, Phase 2 Permitting. Prepared for Oil Shale Exploration Company and Sage Geotech, Inc. July 2007.

cooling water and construction water. The calculations for these estimates are provided in Appendix C. It should be noted that these estimates are based on approximated values of density, temperature, and moisture content of the spent shale after retorting and cooling. These values will be refined once results of Phase 1 are completed, providing better understanding of the water needs for Phase 2 and Phase 3.

3.2.1 Water Usage for Spent Shale Cooling

After retorting, the spent shale leaves the combustion zone at 750°C and is sent to the cooling zone, where it is cooled to approximately 450°C. Once discharged from the cooling zone, the spent shale is sent to an ash moistening unit where it is cooled to 65°C prior to being handled for disposal. Therefore, enough water will be needed to cool the spent shale from 450°C to 65°C. Research on the thermodynamic properties of spent shale by OSEC has indicated that cooling of the spent shale will require a water usage ratio of 2 bbl of water per bbl of oil produced. The Phase 2 research work will assess methods to minimize this ratio.

3.2.2 Water Usage for Pile Construction

After cooling of the spent shale, water will be required for dust suppression and compaction of the spent shale into a pile. For this estimate, it was assumed that the spent shale leaves the ash moistening unit at a water content of 15% and a density of 90 lbs/ft^3 and will be compacted to an optimum moisture content of 22% and a dry density of 97.5 lbs/ft^3. Therefore, the water requirements for this placement scenario will be approximately 1 bbl of water per bbl of oil produced. The Phase 2 research work will assess alternatives to reduce water usage. See Appendix C for calculations supporting this estimate.

3.3 SURFACE WATER CONTROL PLAN

This section provides a surface water control plan for capturing, transporting and storing stormwater. The plan was based on the 100-year 24-hour flood event for the Bonanza weather

station. A description of the hydrological modeling and stormwater channel and storage pond design are provided below and the general layout of the surface water control plan is illustrated in the Drawings.

3.3.1 Hydrological Modeling

The peak discharge for the 100-year 24-hour flood event was determined using the HEC-HMS computer model and checked using the Soil Conservation Method (SCS, 1975) Peak Flow Calculation. The design precipitation from 100-year 24-hour flood event is 2.25 inches. For both the HEC-HMS model and the SCS Method, a curve number of 85 was used to estimate runoff. The curve number of 85 is representative of the Walknolls-Gilston association found in the area of the White River Mine Site. The drainage area (watershed) was estimated to comprise approximately 50 acres. The peak discharge values calculated for the design storm event using the HEC-HMS model and the SCS Method were 4.2 and 3.1 cfs, respectively. The more conservative value of 4.2 cfs was used for the design of the stormwater channels and pond.

3.3.2 Stormwater Channel Design

The stormwater channels are designed to route stormwater discharge from the surrounding drainage area around the spent shale pile to the retention pond. Due to the fairly low estimated peak discharge, V-shaped channels with 3:1 side slopes were chosen. The design dimensions of the channels are 1 foot deep by 6 feet wide. To combat the erosive effects of critical flow through the channel, a six inch thick layer of rip rap will be installed. The D_{50} rip rap size was determined to 1.2 inches. Therefore, the total constructed dimensions of the channel will be 1.5 feet deep by 9 feet wide. A typical cross-section is provided in the Drawings that illustrates the dimensions and construction of the channels.

3.3.3 Stormwater Detention Pond Design

A stormwater detention pond will be constructed at the toe of the spent shale pile to capture all stormwater runoff from the Phase 2 spent shale pile during a 100-year 24-hour flood event. The total storage required from the runoff depth and the pile watershed area was computed to be 7,100 ft^3. The pond will be trapezoidal in shape and have approximate dimensions of 5 feet deep, 50 feet wide and 50 feet long.

Storm Water Channel and Retention Pond sizing Calculations

Objective: Determine size of storm water channels and retention pond for 100-year 24-hour flood at the White river Mine Site.

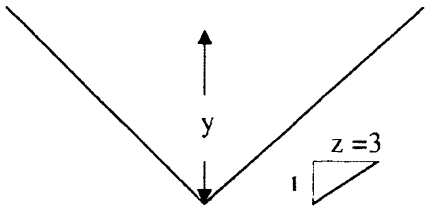
References: National Weather Service: http://dipper.nws.noaa.gov

Methodology: Design peak discharge was determined using HEC-HMS and checked using the SCS Method (SCS, 1978). Channel sizing was performed using the Chezy-Manning Equation.

Assumptions: The drainage area above the Phase II pile is 50.1 acres. It is assumed that half of the peak discharge from the 100-year 24-hour flood is routed through each channel. Retention pond was sized for total storage of 100-year 24-hour flood event. Assume V-shaped channel.

Input:
100-year 24-hour flood for Bonanza = 2.25 inches
Peak Discharge from Drainage Area = 4.2 cfs
Peak Discharge for Each Channel = 2.1 cfs
Channel Slope = 33.4%
Manning's Roughness Coefficient (n) = 0.035
Channel Side Slopes (Horrizontal:Vertical) = 3:1

Channel Sizing Calculation:



$$Q = \frac{1.49}{n} A R^{\frac{2}{3}} \sqrt{S}$$

A = *Wetted Area*

$= zy^2 = 3y^2$

R = *Wetted Perimeter*

$$= \frac{zy}{2\sqrt{1+z^2}} = 0.47y$$

S = *slope*

Golder Associates Inc.

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FINAL REPORT

WHITE RIVER OIL SHALE MINE SITE RECLAMATION PROJECT UINTAH COUNTY, UTAH

VOLUME II OF III

CONCEPTUAL DESIGN REPORT FOR RUNOFF RETENTION DAM RECLAMATION (UTAH DAM NUMBER UT0052)

Submitted to:

Dynamac Corporation
2275 Research Blvd., Suite 500
Rockville, MD 20874

On Behalf of:

U.S. Bureau of Land Management
White River Oil Shale Project, Utah

Submitted by:

Golder Associates Inc.
44 Union Blvd., Suite 300
Lakewood, CO 80228

Distribution:

5 Copies – Bureau of Land Management
1 Copy – Golder Associates Inc.

December 2002 013-2255

2.0 RUNOFF RETENTION DAM BACKGROUND AND SITE DESCRIPTION

As part of the conceptual design, Golder conducted a 2-day site visit to inspect the existing dam to collect any pertinent documentation on the dam. The documents that were made available included:

- Runoff Retention Dam Design Report, White River Shale Project, Tracts Ua and Ub (Ralph M. Parsons (RMP), 1982);
- As-Built topographic data for the reservoir floor (not available in electronic form) (RMP, 1983);
- 1985 Progress Report, Environmental Program, White River Shale Project (WRSOC, 1986) – similar reports for the years 1976 to 1979 and 1982 to 1984 were also available;
- Geohydrology of Plant Site Wash, White River Shale Project, Oil Shale Tract Ua, Uintah County, Utah (VTN Environmental Sciences (VTN), 1983); and
- Recent ground topographic surveys completed by Rocky Mountain Surveyors in December 2001.

Documents that were requested but were unavailable or did not exist included:

- Reports regarding geotechnical investigations of the dam site and dam borrow materials;
- Dam construction As-Built report, and
- Records of spillway discharge.

Several drawings were obtained that were identified to be as-built drawings. These drawings show no significant changes from the design drawings, implying that construction was completed in exact accordance with the design.

2.1 Subsurface Conditions

The retention dam embankment is understood to be founded on alluvial soils overlying bedrock of the Uinta Formation. The Uinta Sandstone Formation is primarily cavernous at the surface, with minor marlstone and siltstone, and bedding dipping at approximately 4° to the northwest (RMP, 1982). Based on investigative drilling, the subsurface strata within 300 feet below the surface at the site of the dam embankment were described (VTN, 1983) as five distinct geological units, summarized in Table 2.1-1 below.

TABLE 2.1-1

SUBSURFACE CONDITIONS SUMMARY

Approximate Extent of Strata* (ft)	Description
GL - 16	Surface Soils and Alluvium – silty sands and gravels with some larger fragments, capped by one or two feet of residual clayey and sandy soil.
16 – 35	Gray Marlstone Unit – laminated gray limy siltstone.
35 – 100	Near Surface Porous Zone – fine silty sandstone, densilog porosity 15% to 25%.
100 - 210	Intermediate Zone – siltstone and fine sandstone, densilog porosity 13% to 17%.
210 - 300	Lower Gradational Zone – shale and siltstone with several distinct clay beds, densilog porosity 7% to 17%.

* Depth below natural ground surface at exploration boring UF-1 – surface elevation approximately 5135 feet (VTN datum).

2.2 Dam Embankment Construction

Drawing 1 shows the existing surface topography and dam layout. The drawing includes data from a previous study performed by the Ralph M. Parsons Company (RMP, 1982), which included both pre-dam and as-built contours of the site topography. Also, recent survey data (December, 2001) of the dam embankment crest and toe areas were incorporated into Drawing 1. The dam embankment has been constructed between bedrock outcrops. According to the available as-built drawings and recent survey data, the dam embankment is approximately 66 feet high (structural height) and 650 feet long (along the dam crest). The

dam embankment was constructed of earthfill and includes an integrated keyway and an 1,800 feet long hanging grout curtain. The grout curtain is considered hanging (in the Near Surface Porous Zone – as identified in Table 2.1-1) as it does not penetrate into relatively low permeability material.

Figure 3 shows a typical dam embankment cross-section as shown in the design report (RMP, 1982). Based on the design report and site visit observations, the dam embankment was constructed as follows:

- Overlying alluvial and colluvial material was stripped to expose fractured sandstone in the foundation prior to embankment construction;
- A keyway approximately 20 feet wide and up to 40 feet deep was excavated down to less fractured rock and drilling was carried out on the floor of the keyway for installation of the grout curtain;
- The central portion of the dam embankment consists of compacted clay core and associated filter layers - the clay was used to backfill the keyway and the core extended upwards to within a couple of feet from the top of the embankment;
- The upstream and downstream shells were constructed of locally available material, probably variably grading silty sands and gravels, with outslopes of 3(H):1(V) upstream and 2.5(H):1(V) downstream;
- The upstream face was partially covered with riprap (rather than fully covered as shown on Figure 3); and
- The downstream face was covered with a layer of rock spalls.

A granular pavement road has been constructed along the length of the dam crest. Guard rails have also been installed along both shoulders.

2.3 Seepage Collection Pond

The Runoff Retention Dam also includes a collection pond located downstream of the dam that was intended to collect seepage from the embankment drainage system. The design

drawings indicate that the floor of the pond is approximately 24 feet square and 6 feet below the original surface. The walls were sloped at 2(H):1(V) with a 2-foot high berm surrounding the structure. A reinforced concrete "well" has been set below the floor of the pond. The design dimensions of the "well" are 10 feet square and approximately 7 feet deep, with a 2 foot deep recessed sump.

2.4 Spillway

The dam includes a reinforced concrete lined rectangular channel spillway located adjacent to the east abutment of the dam embankment. The spillway chute is designed to be 10 feet wide with a minimum chute wall height of 6.5 feet with a minimum capacity to discharge a flow of 252 cubic feet per second (cfs). The spillway design also consists of a 12 foot wide inlet (19.5-foot long transition to the 10-foot wide chute) and a rectangular reinforced concrete stilling basin 10 feet wide, 21 feet long and 8.5 feet deep, followed by a 30 feet long trapezoidal divergent transition to an outlet width of 30 feet. The total length of the spillway is given as 673.5 feet. Further details can be found in the design report (RMP, 1982).

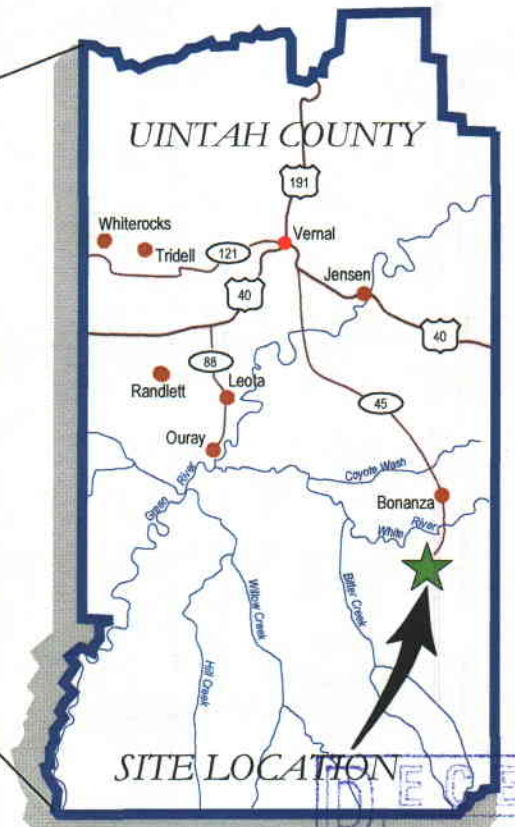
2.5 Site-Specific Comments

During the site inspection carried out by Golder on 17 and 18 July, 2001, no water was ponded upstream of the dam. A small, low area, approximately 150 feet by 200 feet in plan, at the upstream toe of the dam near the east abutment was observed to host a more dense stand of low vegetation (in contrast to the generally sparse, grassy vegetation elsewhere on the impoundment). The more dense vegetation is believed to be the result of temporary saturation of the near-surface soils immediately upstream of the dam embankment following rainfall. There was no evidence that significant volumes of pooled water had ever been contained by the dam embankment for extended time periods, nor was there evidence of significant sediment build up behind the embankment or soil contamination.

Appendix H
Surety Calculations

Figures

LOCATION MAP



VICINITY MAP

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
5	Issued For Final	08/08	R.Martin	C.Fowler	C.Tomlinson

MWH

PROJECT No.: 1005215

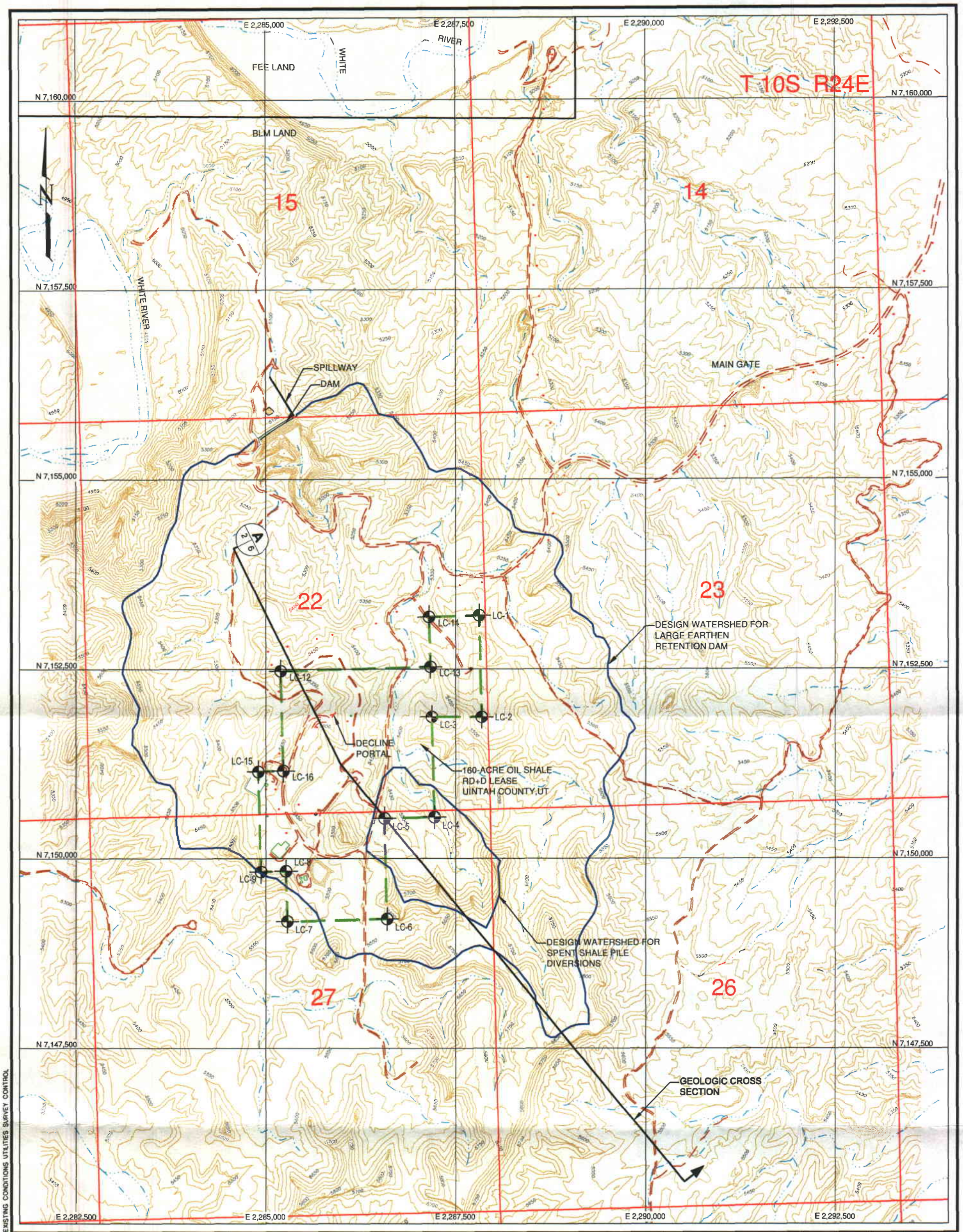
AutoCAD FILE: 1 COVER PAGE.dwg

SCALE: N.T.S.

FIGURE No: 1

WHITE RIVER OIL SHALE MINE

PROJECT LOCATION AND VICINITY MAP



LEGEND

- LEASE BOUNDARY
- DIRT ROAD
- NATURAL DRAINAGE
- BUILDING
- TANK
- MINE ADIT
- POWER POLE
- LEASE BOUNDARY CORNER POINTS
- 22 SECTION NUMBER
- WATERSHED BOUNDARY

NOTE:

1. DRAWING COORDINATES BASED ON NAD83 UTAH CENTRAL AERIAL TOPOGRAPHY SUPPLIED BY OLYMPUS AERIAL SURVEYS INC., AUGUST 29,2006.
2. CORNER POINTS SURVEYED BY TRI-STATE LAND SURVEYING INC. 180 N.VERNAL AVE. VERNAL, UT 84078 SURVEYOR: STACY STEWART, UTAH LICENSED SURVEYOR. # 189377.
3. LEASE AREA IS LOCATED IN TOWNSHIP 10S RANGE 24E.
4. ALL OFF-LEASE ROADS HAVE 40 FT WIDE R.O.W.'S.

SCALE
1200' 0 1200'
CONTOUR INTERVAL 25FT

RECEIVED
SEP - 2 2008
DIV. OF OIL, GAS & MINING

DETAIL/SECTION NUMBER

DRAWING No. WHERE DETAIL/SECTION IS REFERENCED

DRAWING No. WHERE DETAIL/SECTION IS SHOWN

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
6	Issued For Final	08/08	R.Martin	C.Foster	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

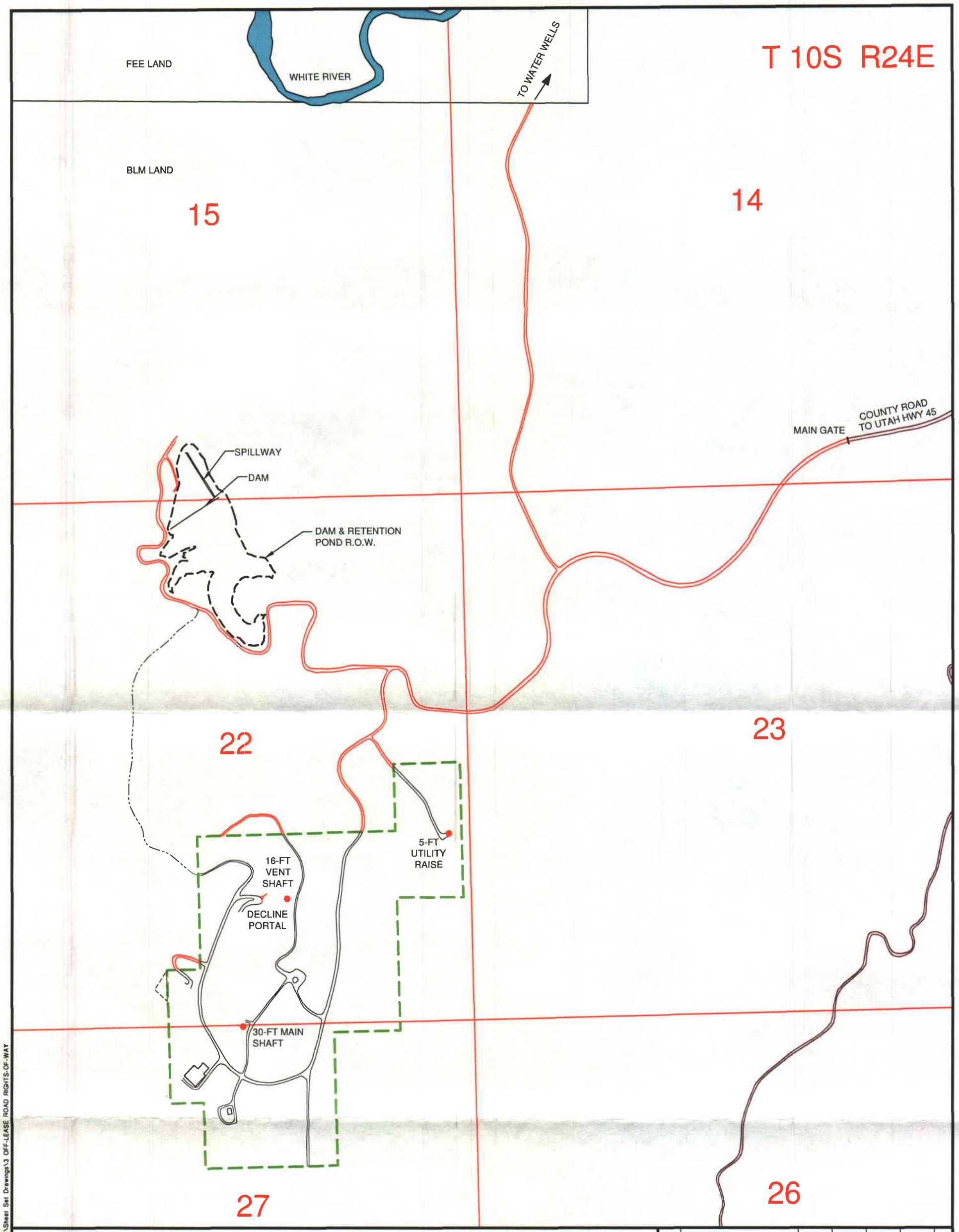
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
BASE MAP AND WATERSHED BOUNDARIES

MWH

Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 2

J:\1005215 OSEC\Phase II Spent Oil Shale Stockpile Plans\Sheet Set\2 EXISTING CONDITIONS UTILITIES SURVEY CONTROL



LEGEND

- ON SITE ROADS
- OFF LEASE ROADS FOR R.O.W.'S
- LEASE BOUNDARY
- ELECTRICAL BUILDING LAY DOWN YARD R.O.W.
- NATURAL DRAINAGE CHANNEL
- RETENTION DAM SITE R.O.W.

N

N.T.S

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
6	Issued For Final	06/06	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
OFF-LEASE RIGHTS-OF-WAY

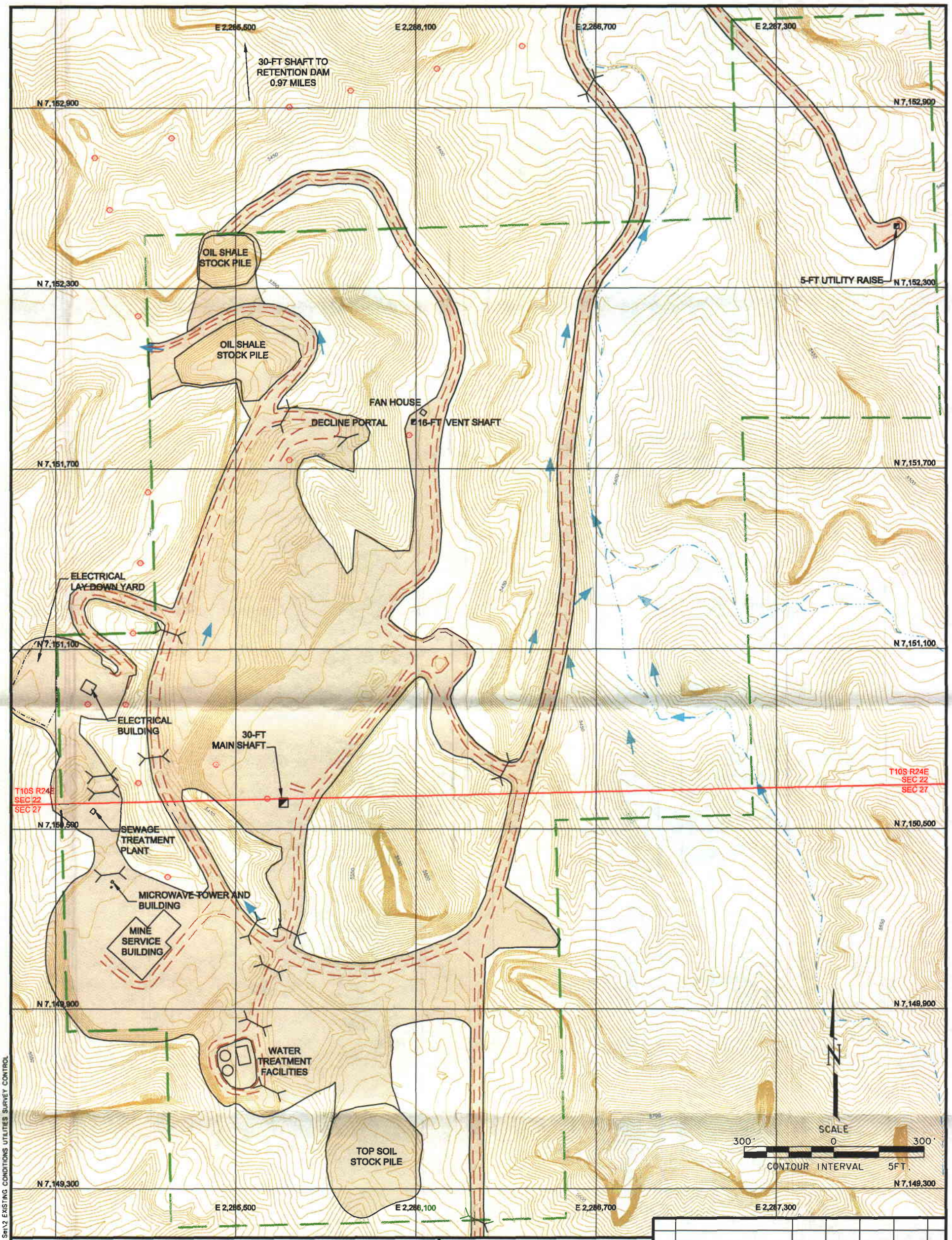
MWH

Sheet 1 Of 1 Sheets

SCALE: N.T.S

FIGURE No. 3

N:\Design-Drafting\Clients I-P\OSEC\1005215 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\3 OFF-LEASE ROAD RIGHTS-OF-WAY



LEGEND

- LEASE BOUNDARY
- DIRT ROAD
- NATURAL DRAINAGE
- BUILDING
- TANK
- MINE ADIT
- POWER POLE
- SURFACE WATER FLOW DIRECTION
- SHAFT
- CULVERT
- ELECTRICAL BUILDING LAY DOWN YARD R.O.W.
- PREVIOUSLY DISTURBED AREA

NOTE:

1. DRAWING COORDINATES BASED ON NAD83 UTAH CENTRAL AERIAL TOPOGRAPHY SUPPLIED BY OLYMPUS AERIAL SURVEYS INC., AUGUST 29,2006.
2. CORNER POINTS SURVEYED BY TRI-STATE LAND SURVEYING INC. 180 N.VERNAL AVE. VERNAL, UT 84078
   SURVEYOR: STACY STEWART, UTAH LICENSED SURVEYOR. # 189377.
3. LEASE AREA IS LOCATED IN TOWNSHIP 10S RANGE 24E.
4. ALL OFF-LEASE ROADS HAVE 40 FT WIDE R.O.W.'S.

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B	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

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Oil Shale Exploration Company, LLC

PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
EXISTING SITE LAYOUT 2007

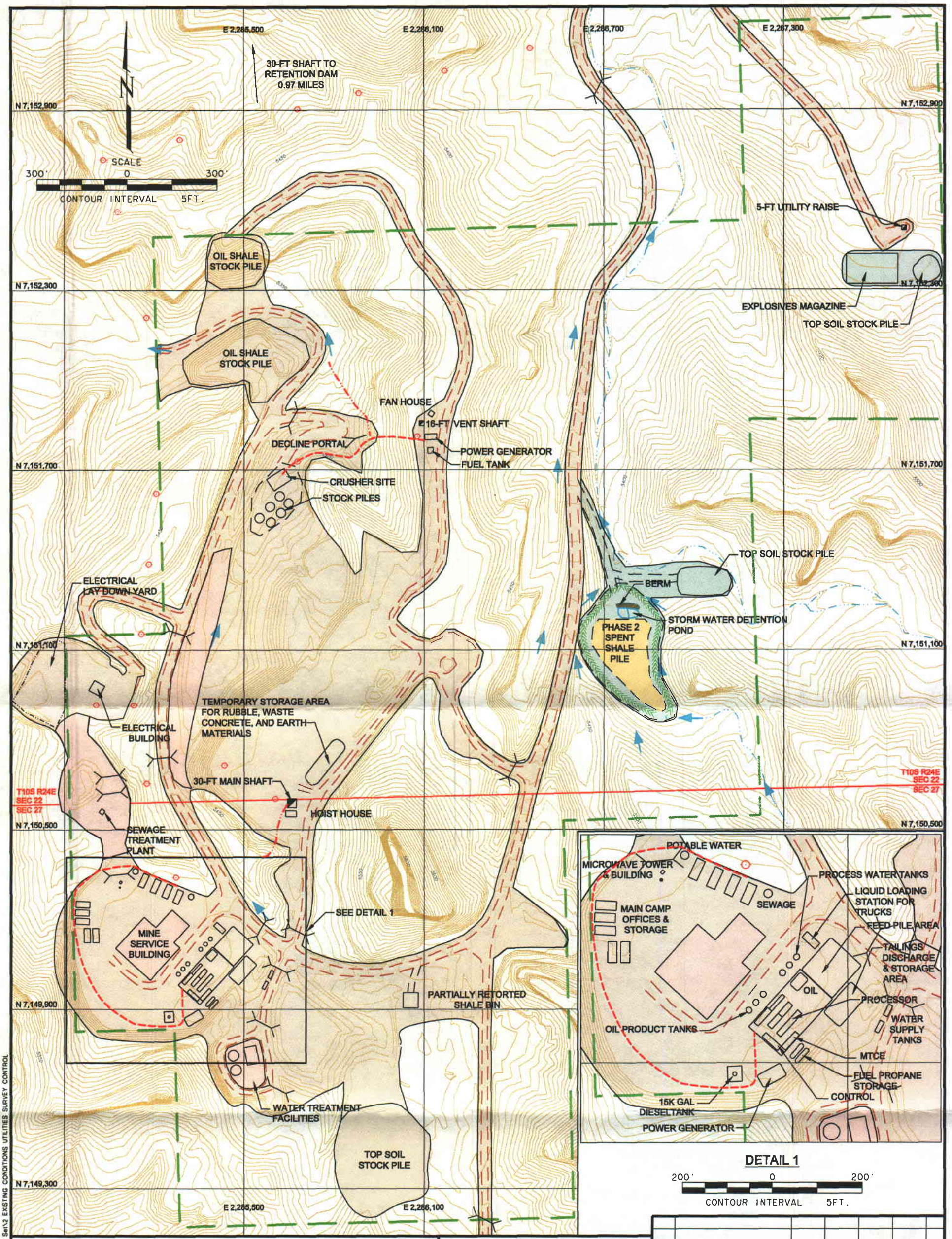
MWH

Sheet 1 Of 1 Sheets

SCALE: As Shown

FIGURE No. 4

J:\1008215 OSEC\Phase II Spent Oil Shale Stockpile Plans\Sheet Set\2 EXISTING CONDITIONS UTILITIES SURVEY CONTROL



DETAIL 1

200' 0 200'

CONTOUR INTERVAL 5FT.

LEGEND

- LEASE BOUNDARY
- DIRT ROAD
- NATURAL DRAINAGE
- BUILDING
- TANK
- MINE ADIT
- POWER POLE
- SURFACE WATER FLOW DIRECTION
- SHAFT
- CULVERT
- PROPOSED FACILITY
- PIPE LINE
- POWER LINE
- PREVIOUSLY DISTURBED AREA
- PREVIOUSLY DISTURBED AREA (NOT OCCUPIED)
- AREA TO BE DISTURBED

NOTE:

1. DRAWING COORDINATES BASED ON NAD83 UTAH CENTRAL AERIAL TOPOGRAPHY SUPPLIED BY OLYMPUS AERIAL SURVEYS INC., AUGUST 29,2006.
2. CORNER POINTS SURVEYED BY TRI-STATE LAND SURVEYING INC. 180 N.VERNAL AVE. VERNAL, UT 84078 SURVEYOR: STACY STEWART, UTAH LICENSED SURVEYOR. # 189377.
3. LEASE AREA IS LOCATED IN TOWNSHIP 10S RANGE 24E.
4. ALL OFF-LEASE ROADS HAVE 40 FT WIDE R.O.W.'S.

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8	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
PROPOSED PHASE 2 OPERATIONS

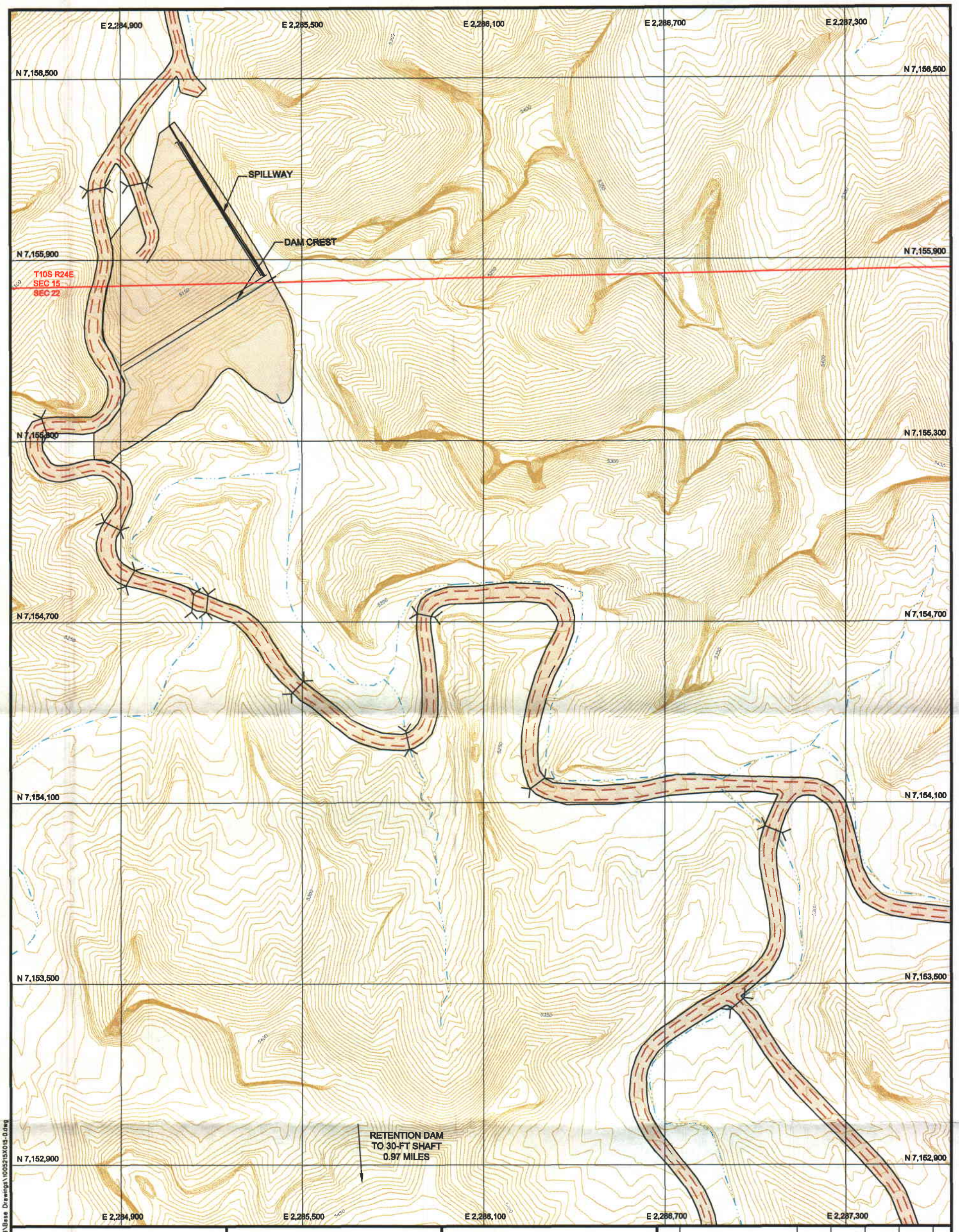
MWH

Sheet 1 Of 1 Sheets

SCALE: As Shown

FIGURE No. 5A

J:\1005215 OSEC\Phase II Spent Oil Shale Stockpile Plans\Sheet Set\2 EXISTING CONDITIONS UTILITIES SURVEY CONTROL



LEGEND

- DIRT ROAD
- NATURAL DRAINAGE
- PREVIOUSLY DISTURBED AREA

NOTE:

1. DRAWING COORDINATES BASED ON NAD83 UTAH CENTRAL AERIAL TOPOGRAPHY SUPPLIED BY OLYMPUS AERIAL SURVEYS INC., AUGUST 29,2006.
2. CORNER POINTS SURVEYED BY TRI-STATE LAND SURVEYING INC. 180 N.VERNAL AVE. VERNAL, UT 84078
   SURVEYOR: STACY STEWART, UTAH LICENSED SURVEYOR. # 189377.

N

SCALE
300' 0 300'
CONTOUR INTERVAL 5FT.

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
8	Issued For Final	08/08	H.Earnest	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

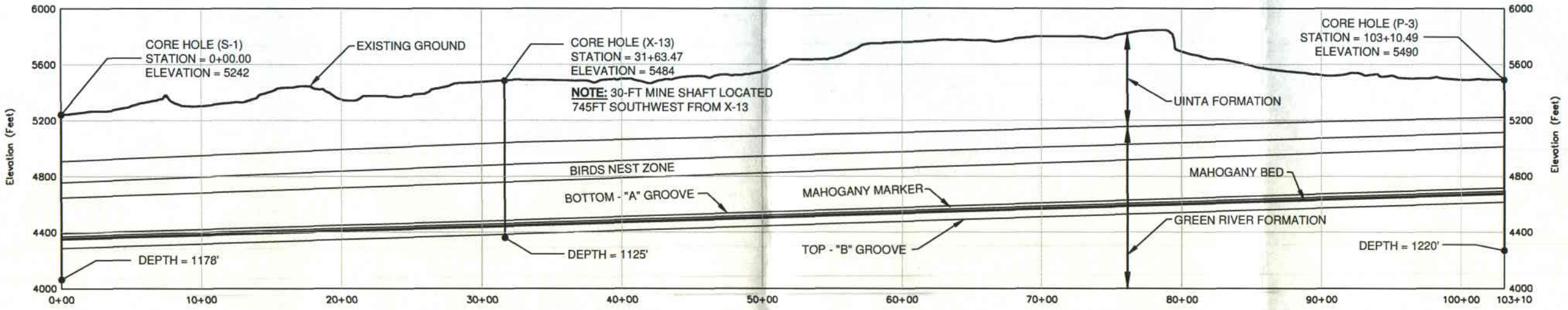
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
DISTURBANCE ASSOCIATED WITH EXISTING RUNOFF RETENTION DAM

MWH

Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 5B

N:\Design-Drafting\Clients I-P\OSEC\100215 Phase 2 Rev 3 Apr 2008\Base Drawings\100215X015-0.dwg



A 2 6 **GEOLOGIC CROSS SECTION (LOOKING NORTHEAST)**

0 800'

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8	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

PROJECT:
WHITE RIVER OIL SHALE MINE

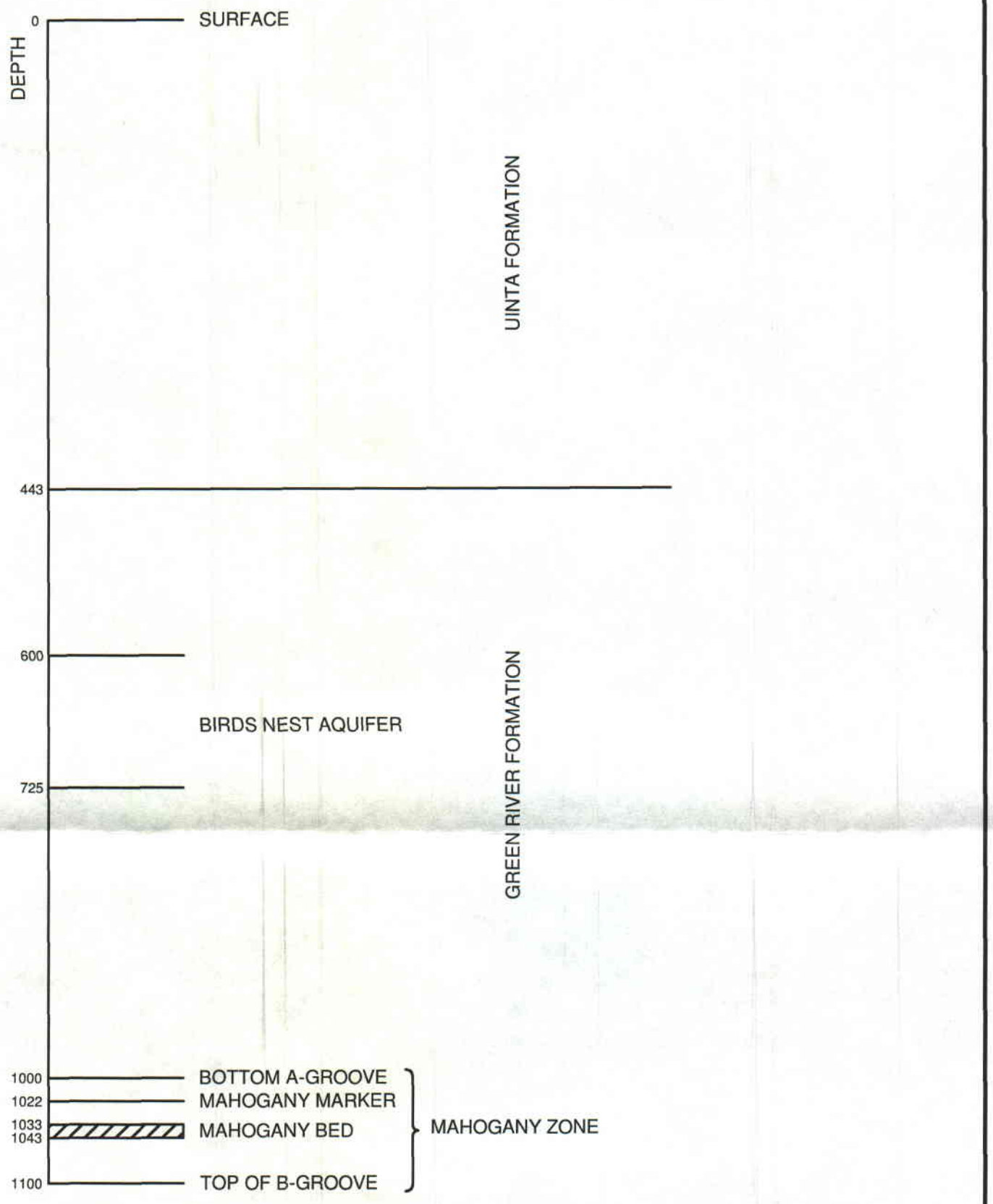
DRAWING TITLE:
GEOLOGIC CROSS SECTION

MWH

Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 6

N:\Design-Drafting\Clients I-P\OSEC\100525 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\6 GEOLOGIC CROSS SECTION

CORE HOLE X-13 AT WHITE RIVER MINE SITE



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B	Issued For Final	08/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

PROJECT: **WHITE RIVER OIL SHALE MINE**

DRAWING TITLE: **GEOLOGIC SECTION CORE HOLE X-13**

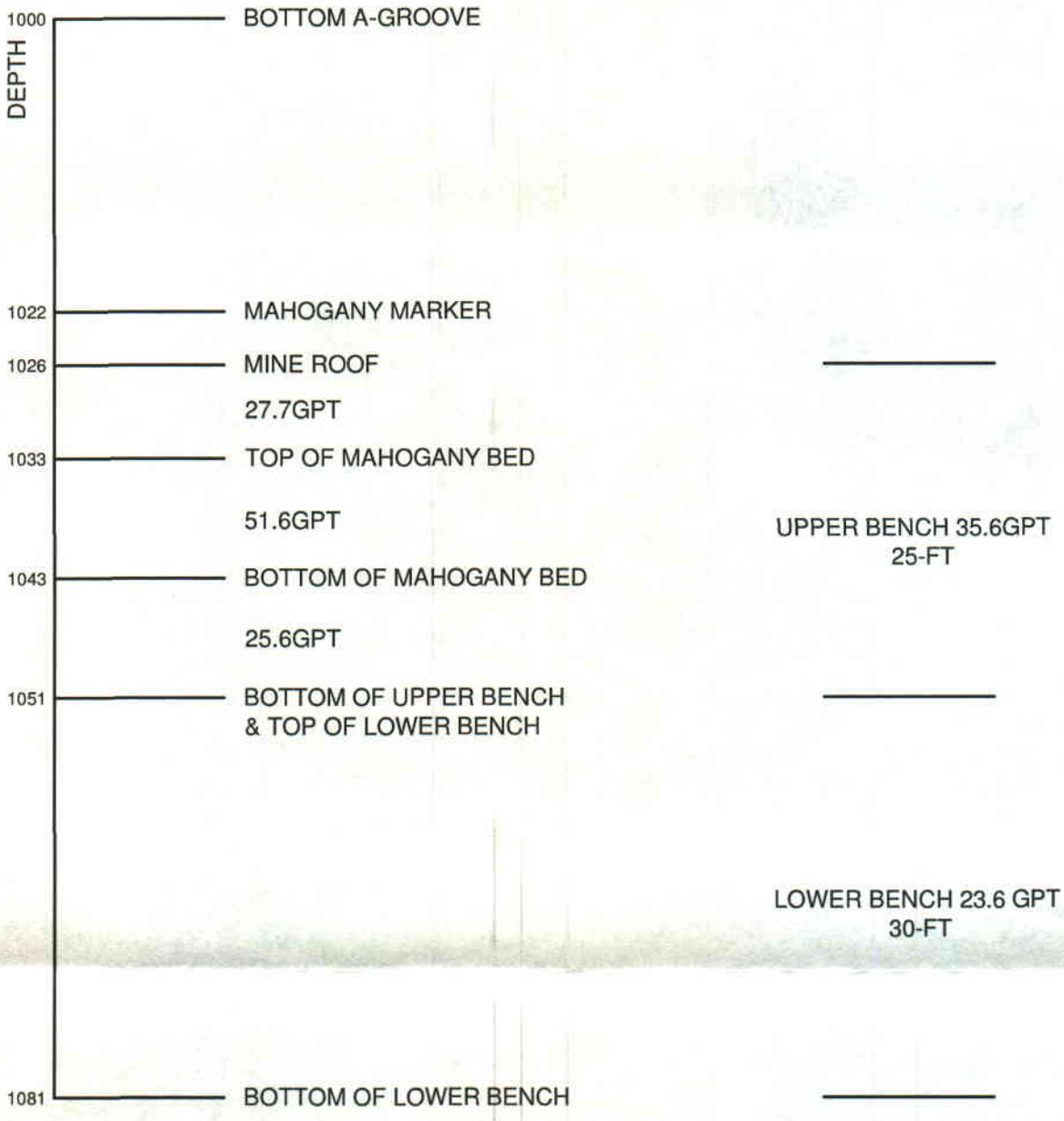
MWH

Sheet 1 Of 1 Sheets

SCALE: N.T.S

FIGURE No. 7A

N:\Design-Drafting\Clients I-P\OSEC\1005215 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\7A GEOLOGIC SECTION CORE HOLE X-13



NOTE: AVERAGE GRADE FOR 55 - FOOT MINING ZONE IS 29 GPT.

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B	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
MAHOGANY ZONE SECTION
CORE HOLE X-13

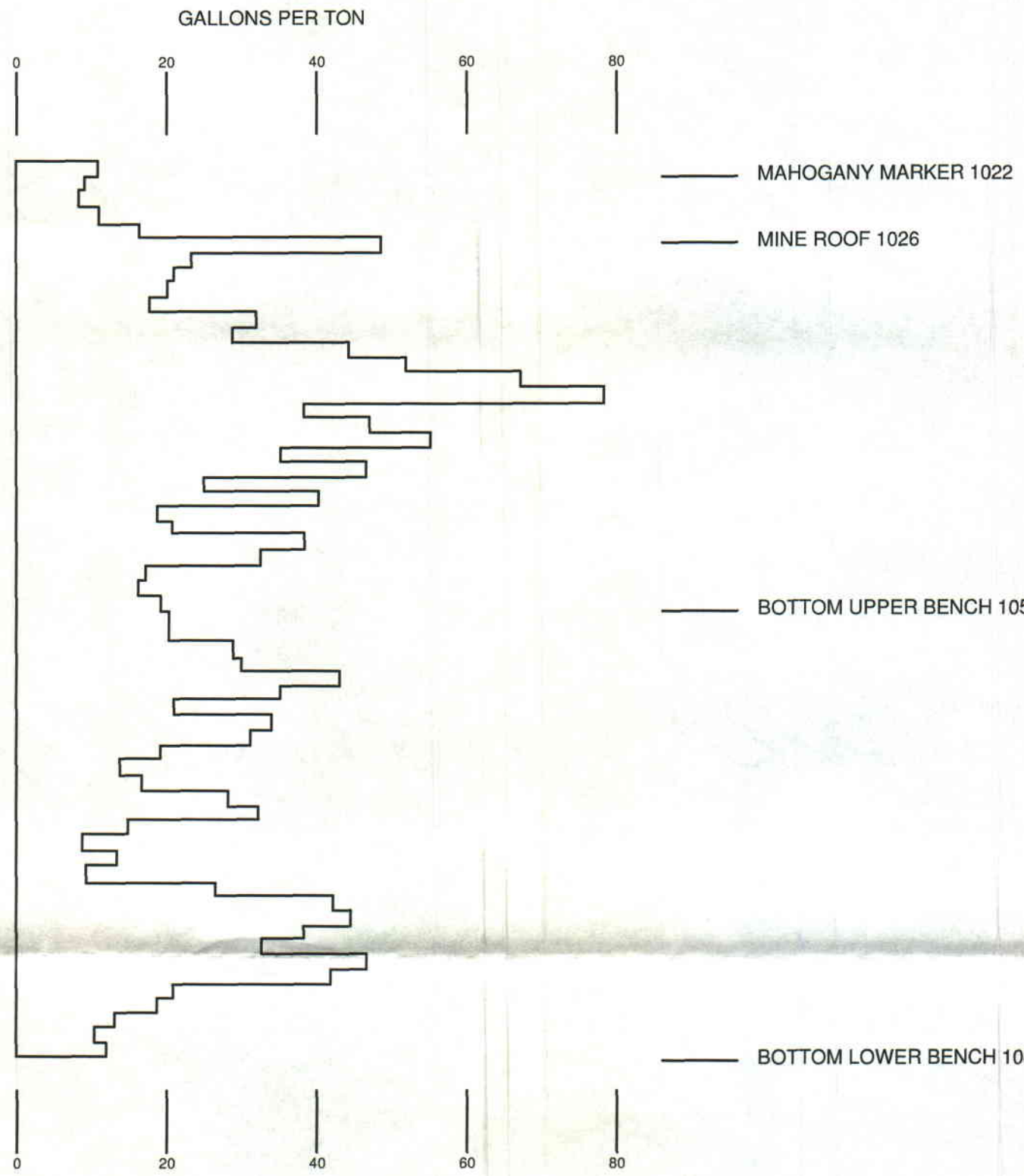
MWH

Sheet 1 Of 1 Sheets

SCALE: N.T.S

FIGURE No. 7B

N:\Design-Drilling\Clients I-P\OSEC\1005215 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\7B MAHOGANY ZONE SECTION CORE HOLE X-13



NOTE: AVERAGE GRADE FOR 55 - FOOT MINING ZONE IS 29 GPT.

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8	Issued For Final	08/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
OIL SHALE GRADE HISTOGRAM
CORE HOLE X-13

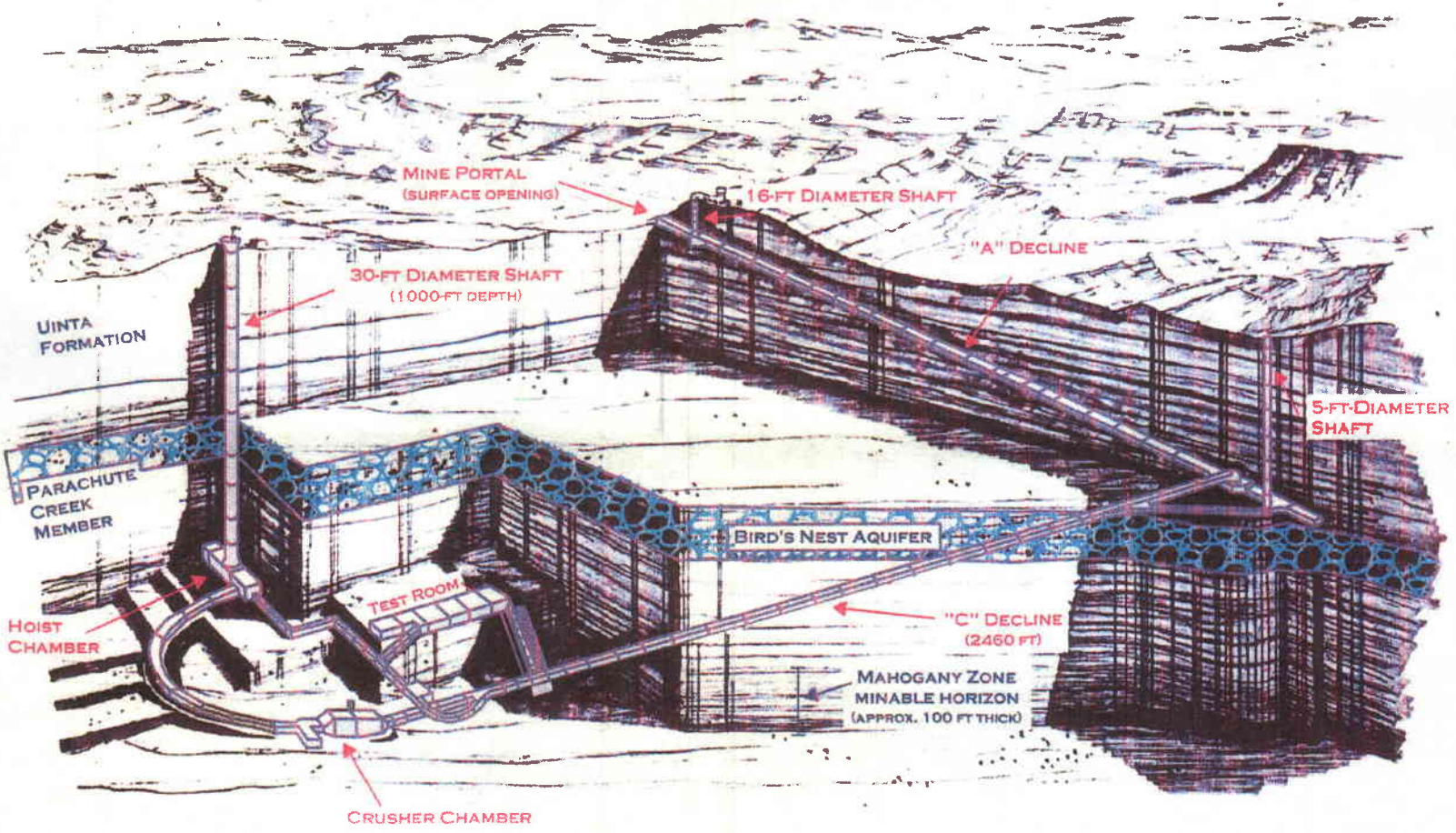
MWH

Sheet 1 Of 1 Sheets

SCALE: N.T.S

FIGURE No. 8

N:\Design-Drafting\Clients I-P\OSEC\100515 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\8 OIL SHALE GRADE HISTOGRAM CORE HOLE X-13



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B	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

MWH

PROJECT No.: 1005215

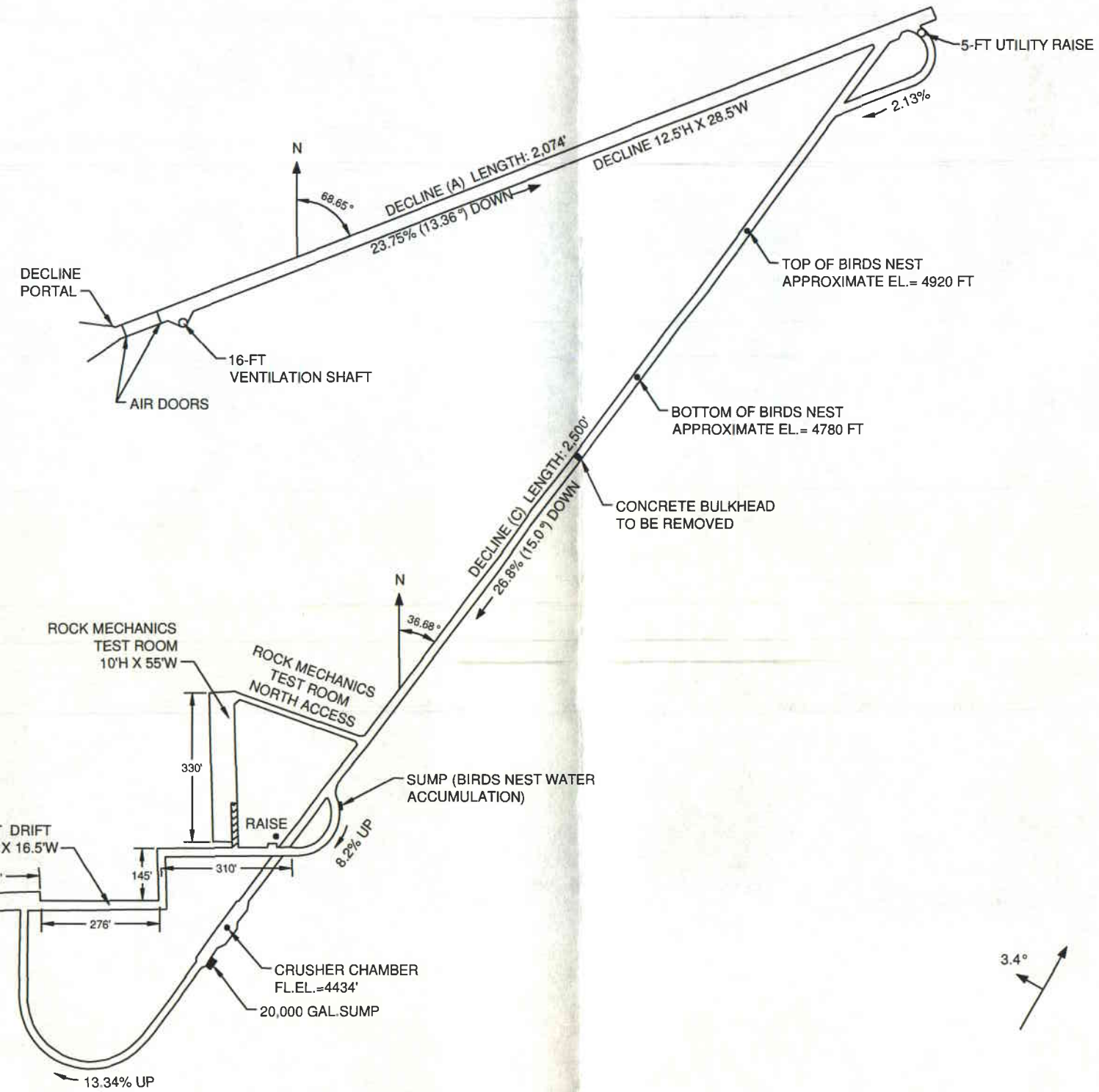
AutoCAD FILE: 9CROSS - SECTION SKETCH

SCALE: N.T.S.

FIGURE No. 9

WHITE RIVER OIL SHALE MINE

CROSS-SECTION SKETCH OF EXISTING MINE 2007



MINE AND DECLINE PLAN VIEW

3.4°

NOTE:
ENTRY FLOOR EL. WILL FOLLOW FORMATION DIP.

N

SCALE
300' 0 300'

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
5	Issued For Final	05/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

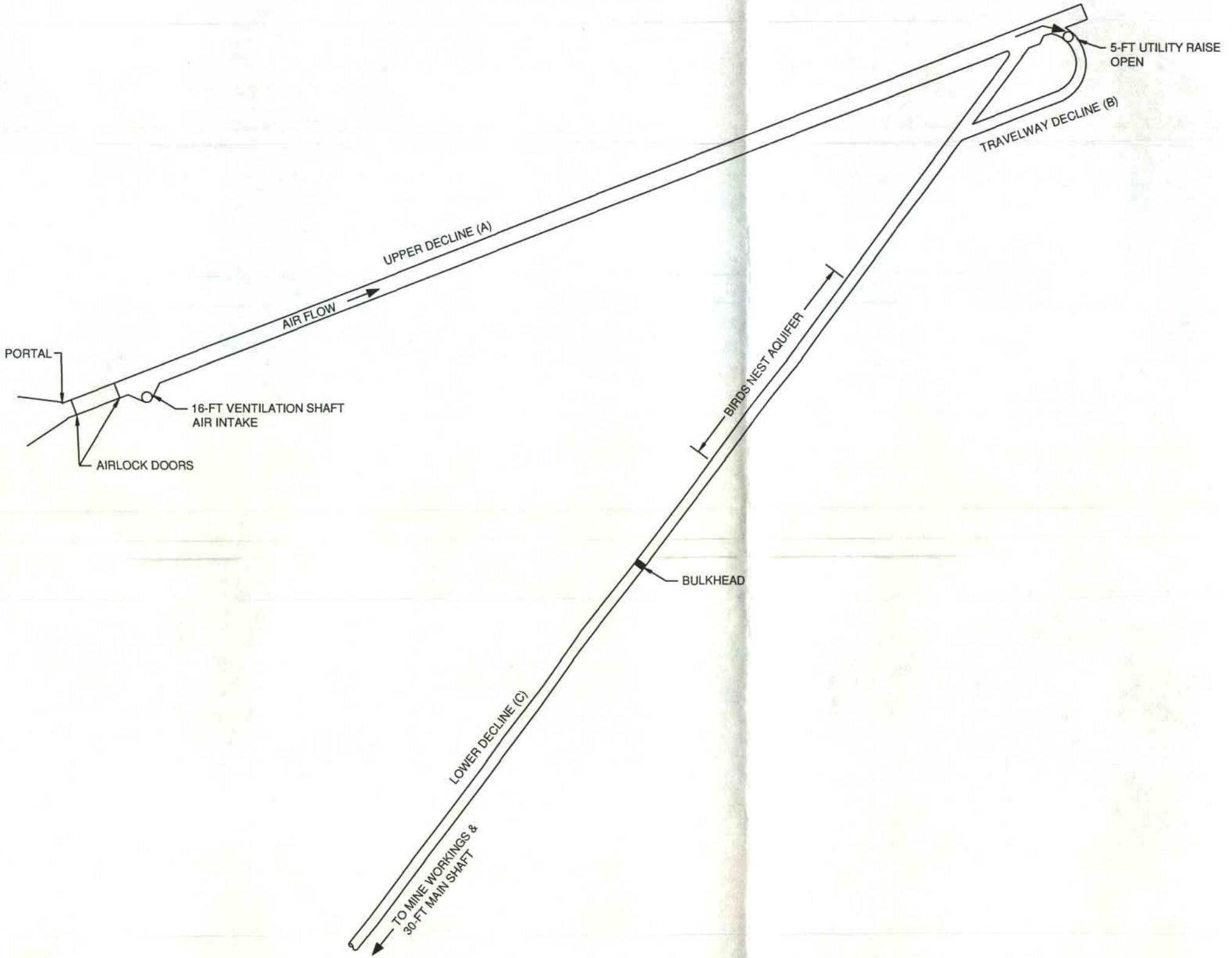
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
EXISTING MINE LAYOUT

MWH

Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 10

N:\Design-Drafting\Clients LP\OSEC\005215 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\10 EXISTING MINE LAYOUT



PLAN VIEW

N

SCALE
200' 0 200'

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
8	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

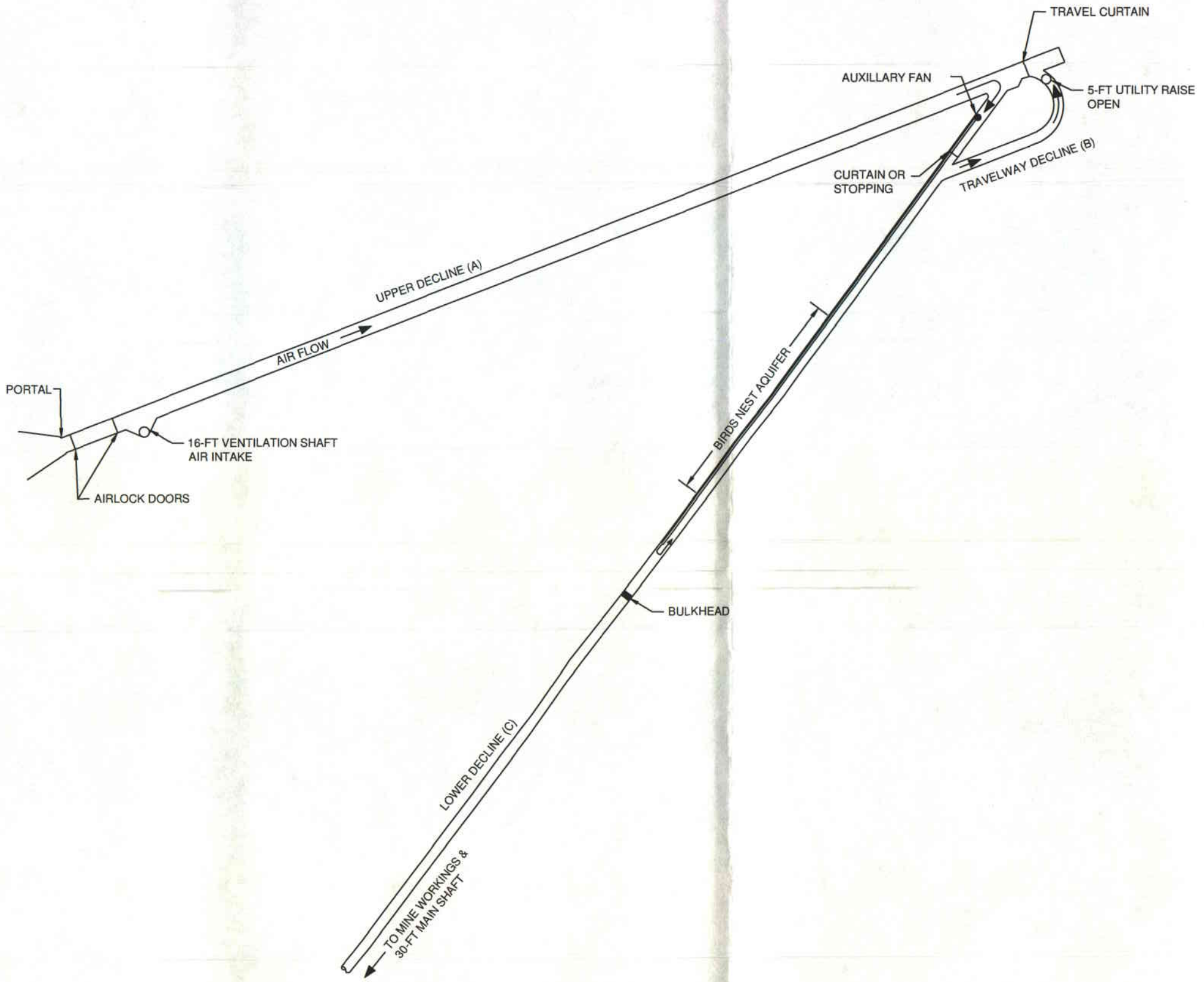
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
VENTILATION PLAN FOR MINE REOPENING STAGE 5

MWH

Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 11A

N:\Design-Drafting\Clients I-P\OSEC\100525 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\11A VENTILATION PLAN FOR MINE REOPENING STAGE 5



PLAN VIEW

N

SCALE
200' 0 200'

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
B	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

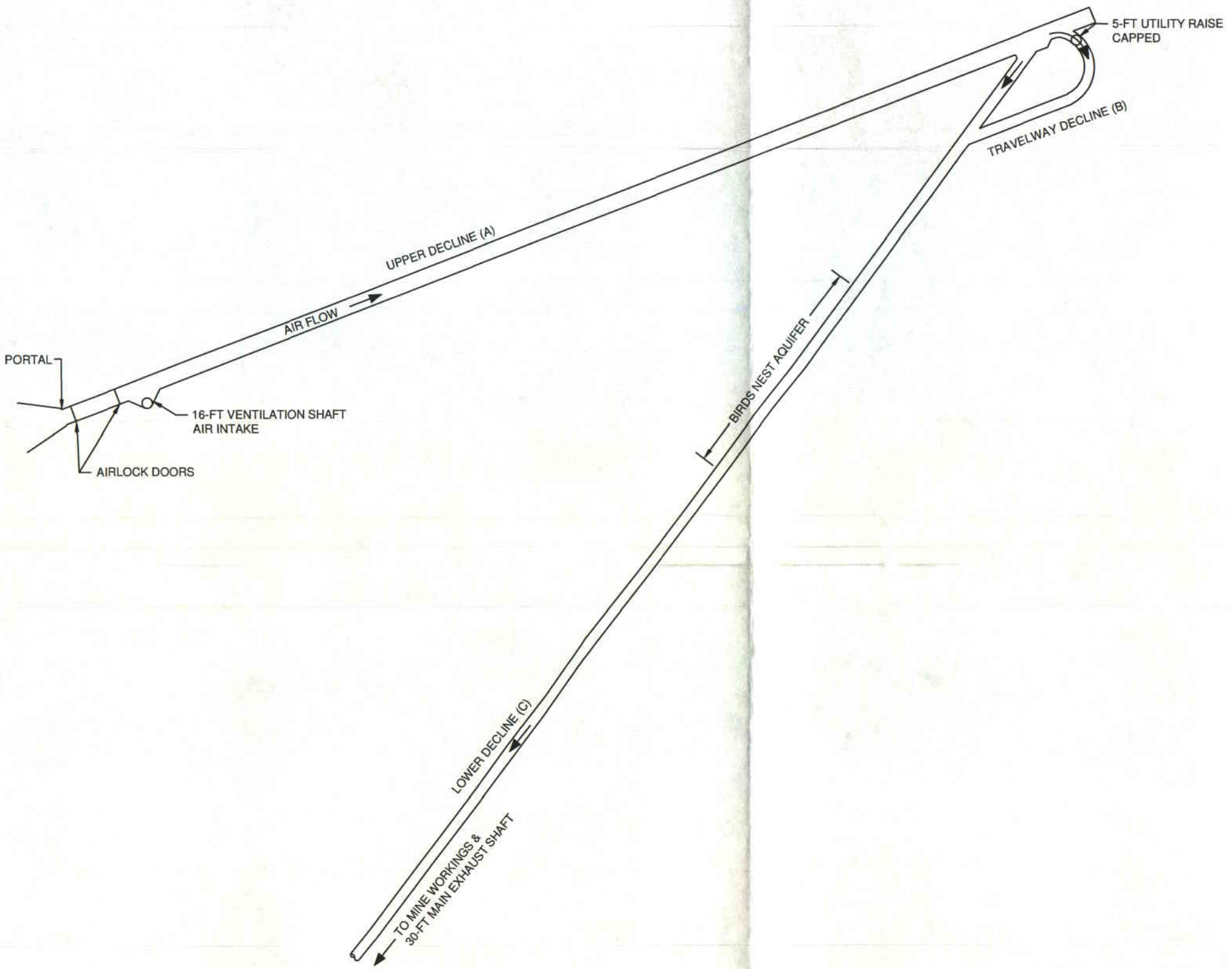
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
VENTILATION PLAN FOR MINE REOPENING STAGE 6

MWH

Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 11B

N:\Design-Drafting\Clients \P\OSEC\1005215 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\11B VENTILATION PLAN FOR MINE REOPENING STAGE 6



PLAN VIEW

N

SCALE
200' 0 200'

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
8	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

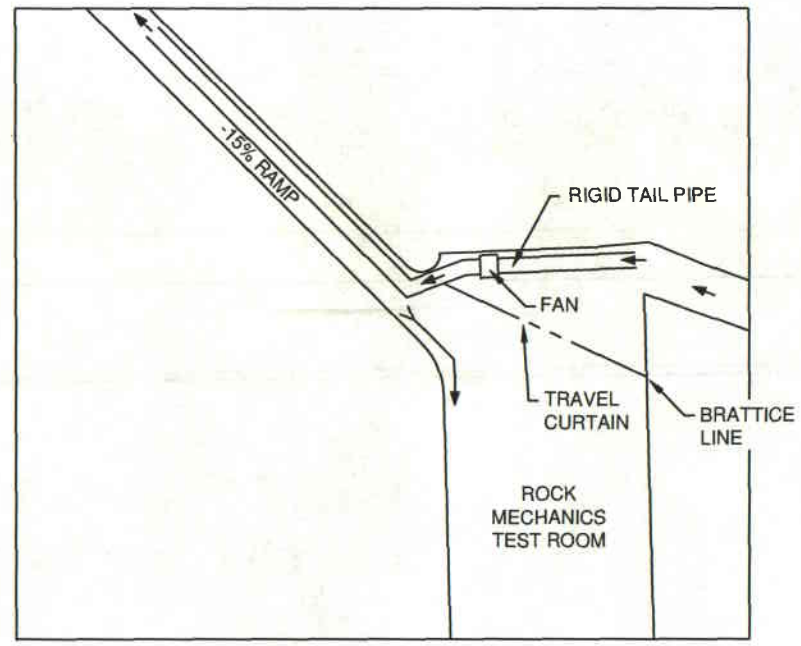
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
VENTILATION PLAN FOR MINE REOPENING STAGE 7

MWH

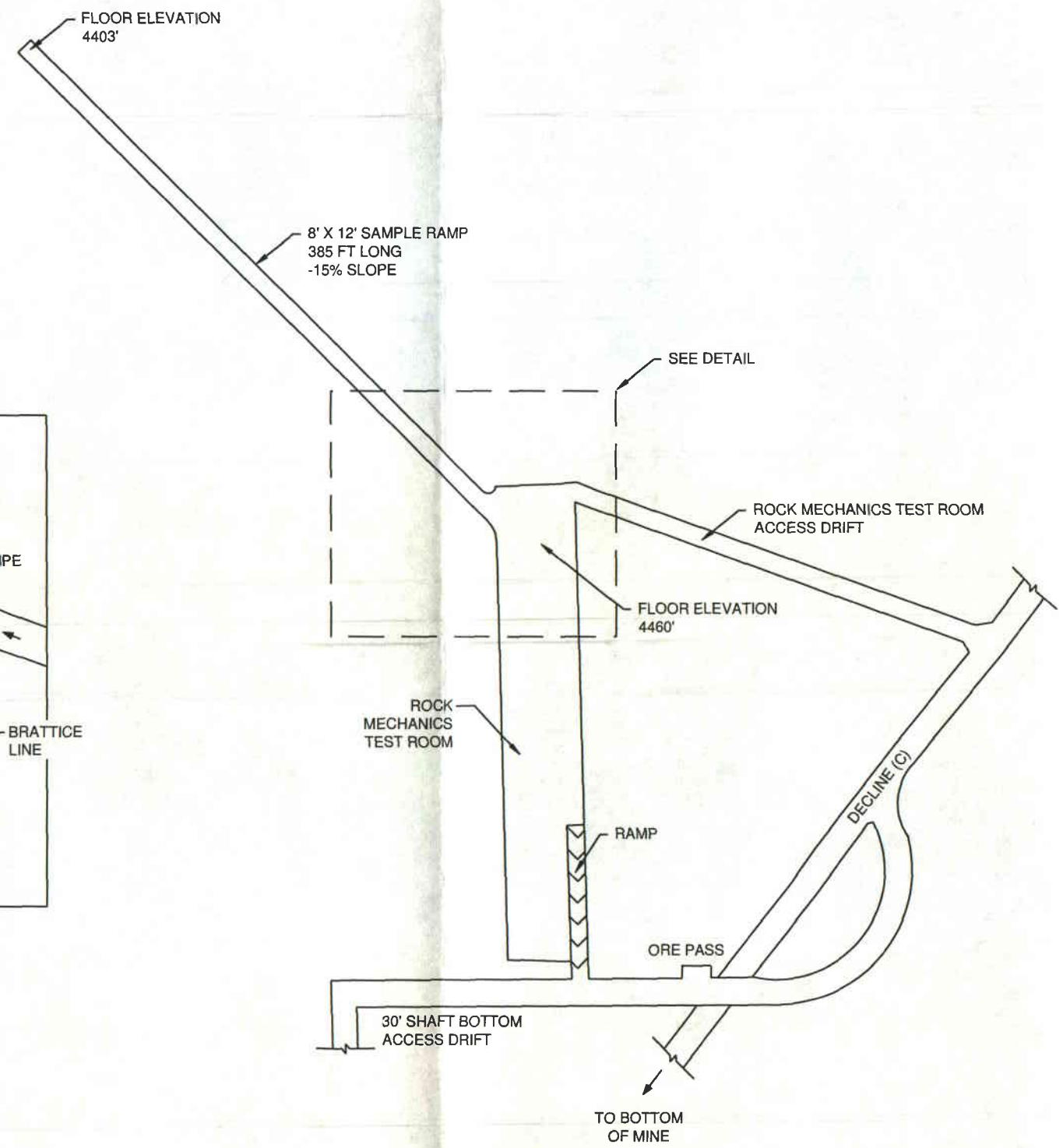
Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 11C

N:\Design-Drafting\Clients\P-VOSEC\100529 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\11C VENTILATION PLAN FOR MINE REOPENING STAGE 7



ROCK MECHANICS TEST ROOM VENTILLATION SCHEMATIC

SCALE 0 50'



PLAN VIEW

SCALE 0 100'

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5	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
PHASE 2
PROPOSED SAMPLE RAMP

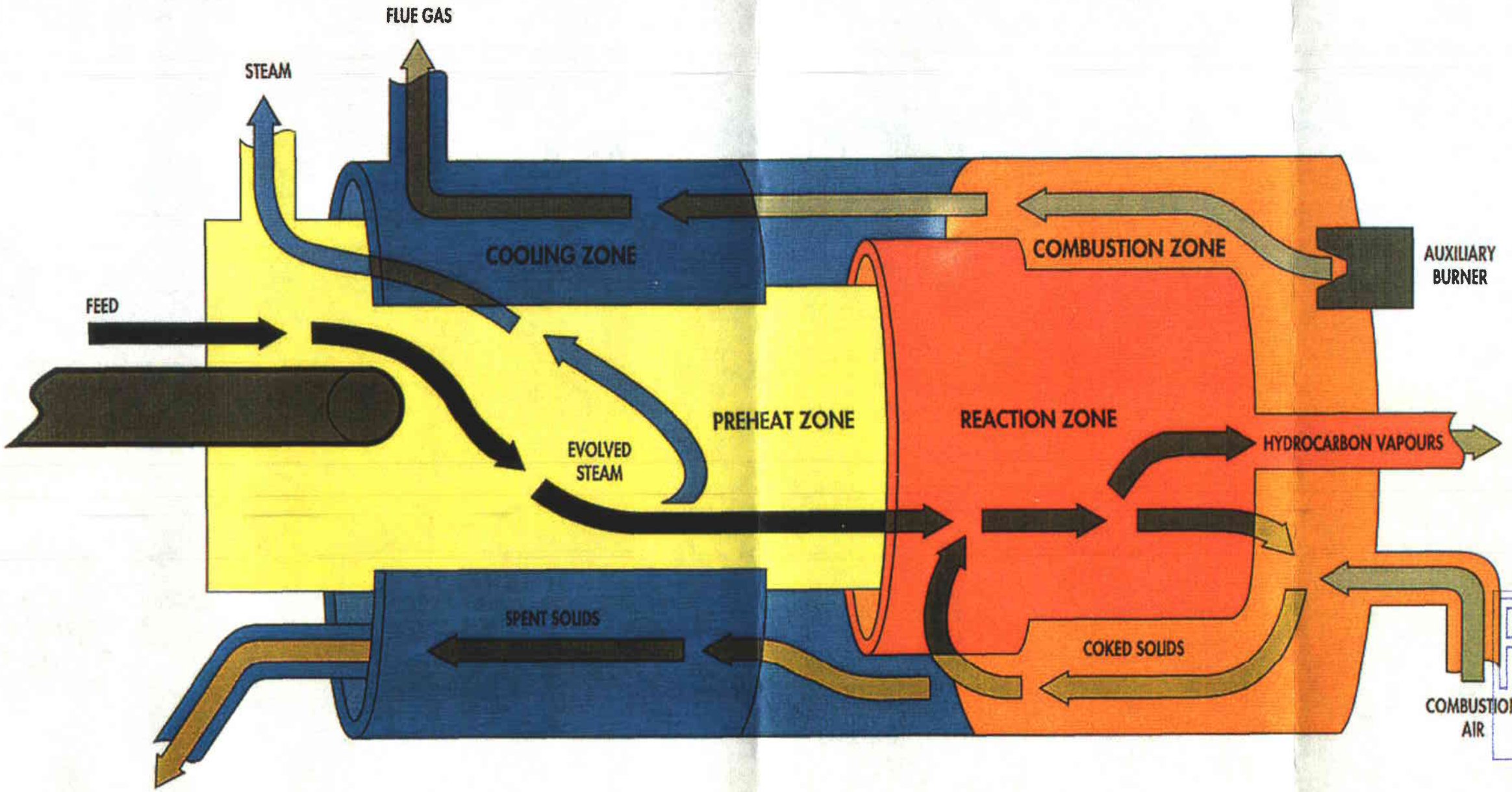
MWH

Sheet 1 Of 1 Sheets

SCALE: As Shown

FIGURE No. 12

N:\Design-Drafting\Clients I-P\OSEC\1005215 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\12 PHASE 2



REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
B	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
SCHEMATIC OF ATP RETORT

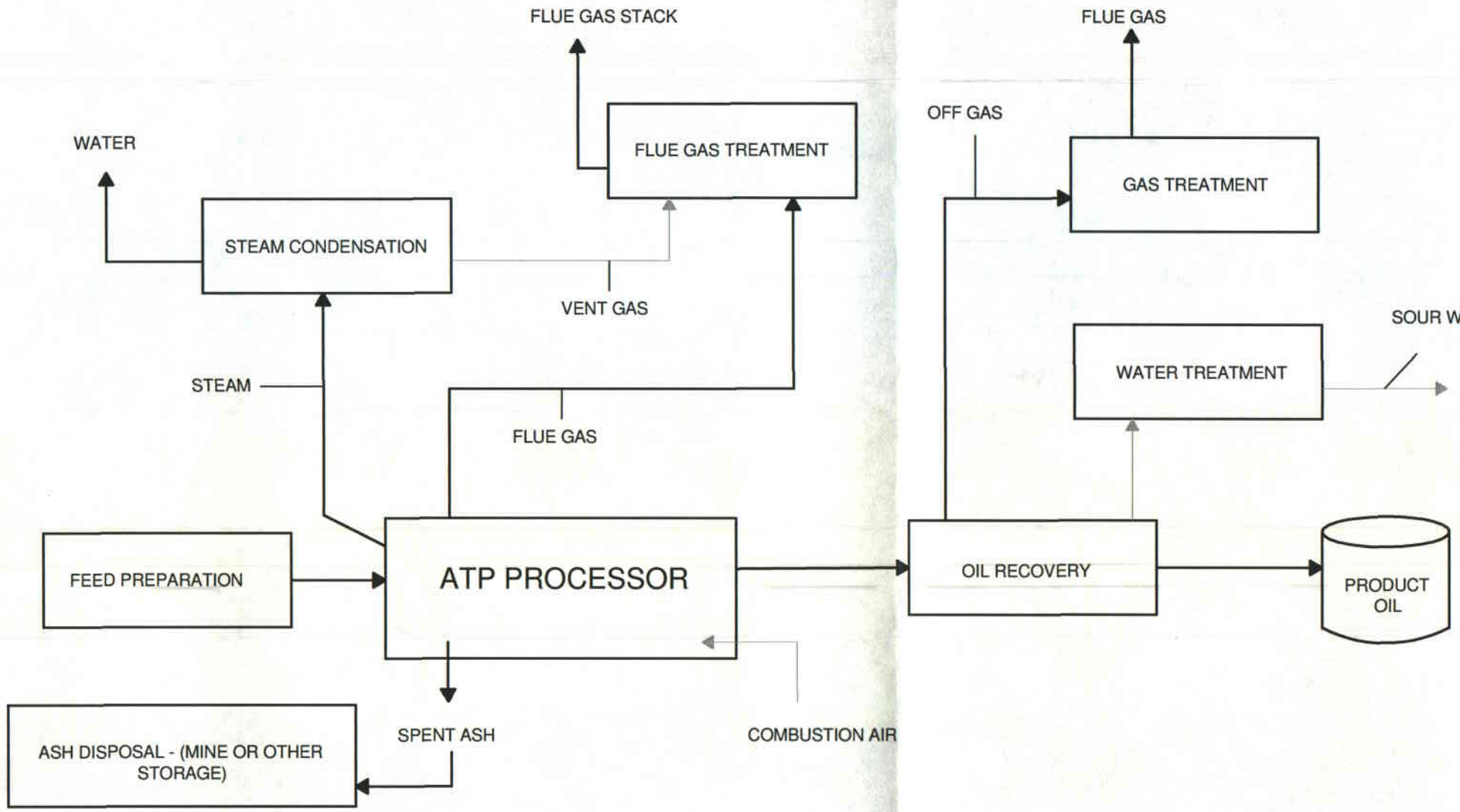
MWH

Sheet 1 Of 1 Sheets

SCALE: As Shown

FIGURE No. 13

N:\Design-Drafting\Clients I-P\OSEC\1003215 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\13 SCHEMATIC OF ATP RETORT



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OSEC
Oil Shale Exploration Company, LLC

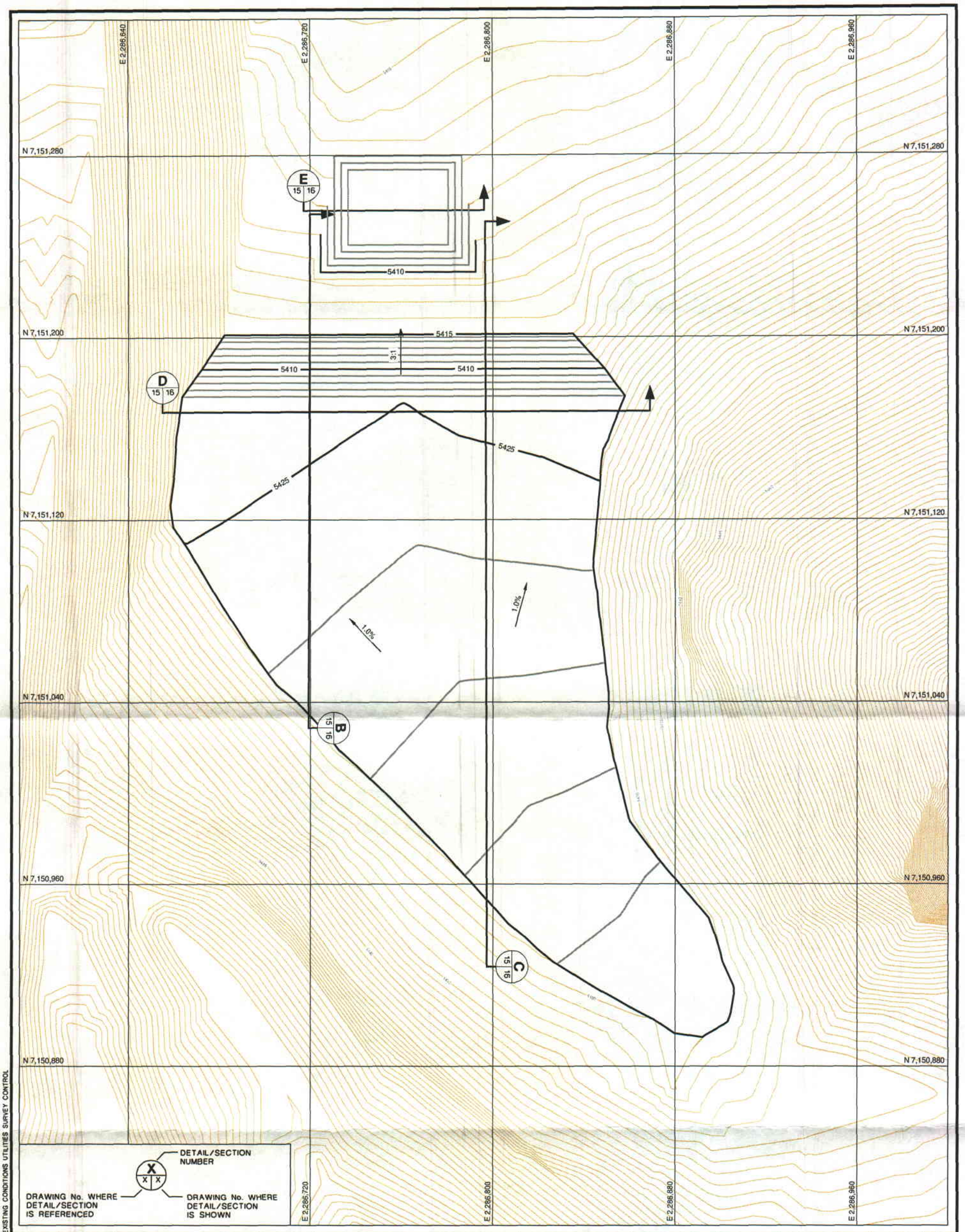
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
ATP SYSTEM FLOW CHART

MWH

Sheet 1 Of 1 Sheets
SCALE: N.T.S.
FIGURE No. 14

N:\Design-Drafting\Clients I-P\OSEC\1003215 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\14 ATP SYSTEM FLOW CHART



LEGEND

- FINAL GRADE CONTOUR
- EXISTING CONTOUR
- SPENT SHALE PILE BOUNDARY

NOTE:

1. DRAWING COORDINATES BASED ON NAD83 UTAH CENTRAL AERIAL TOPOGRAPHY SUPPLIED BY OLYMPUS AERIAL SURVEYS INC., AUGUST 29,2006.
2. PILE VOLUME = 7,830 CY

N

SCALE
40' 0 40'
CONTOUR INTERVAL IFT.

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OSEC
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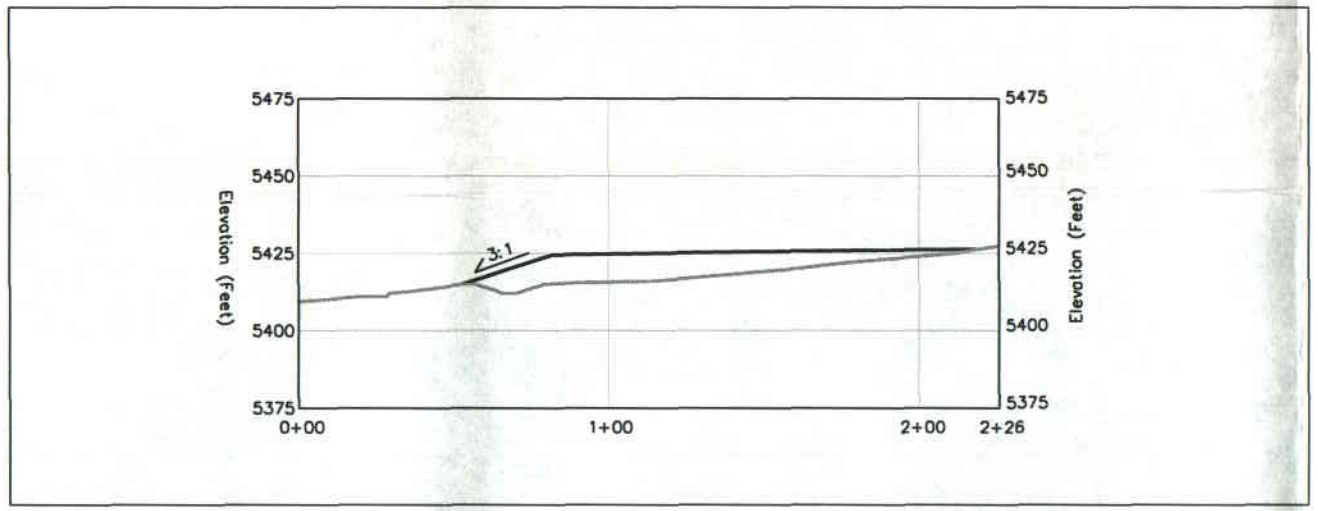
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
PROPOSED PHASE 2 SPENT SHALE PILE CONFIGURATION

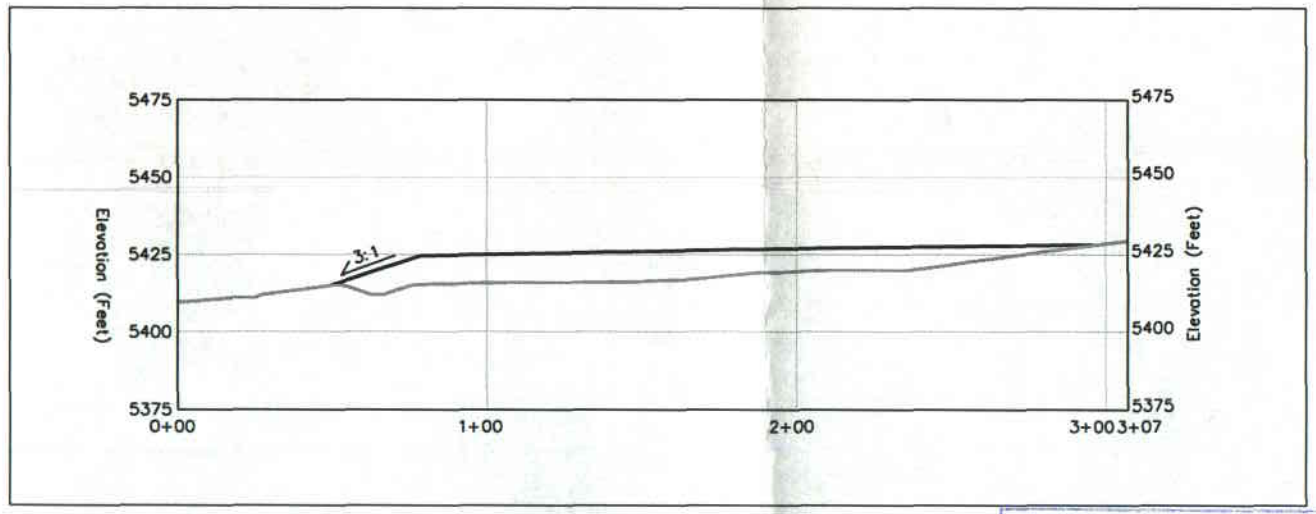
MWH

Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 15

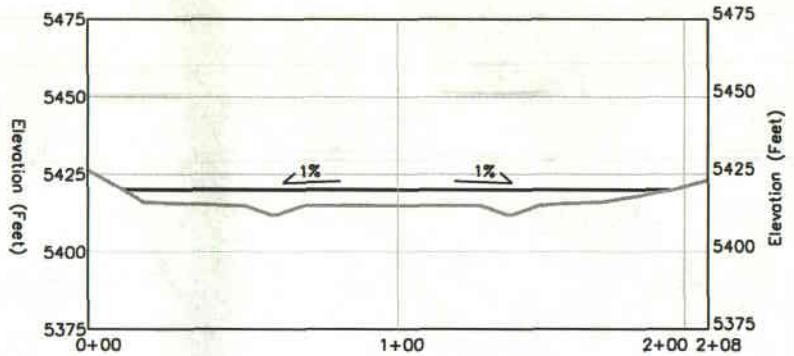
J:\1005215 OSEC\Phase II Spent Oil Shale Stockpile Plans\Sheet Set\2 EXISTING CONDITIONS UTILITIES SURVEY CONTROL



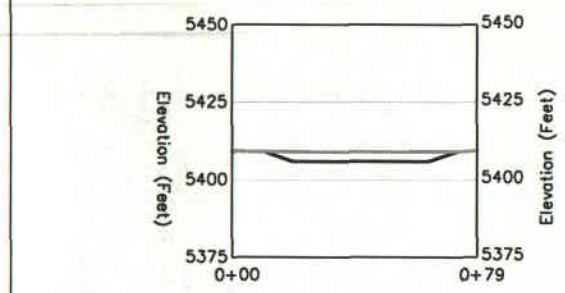
B 15 16 **SECTION B**
0 60'



C 15 16 **SECTION C**
0 60'



D 15 16 **SECTION D**
0 60'



E 15 16 **SECTION E**
0 60'

LEGEND

FINAL GRADE SURFACE
SUBGRADE SURFACE

X / X — DETAIL/SECTION NUMBER
DRAWING No. WHERE DETAIL/SECTION IS REFERENCED
DRAWING No. WHERE DETAIL/SECTION IS SHOWN

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8	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

OSEC — Oil Shale Exploration Company, LLC

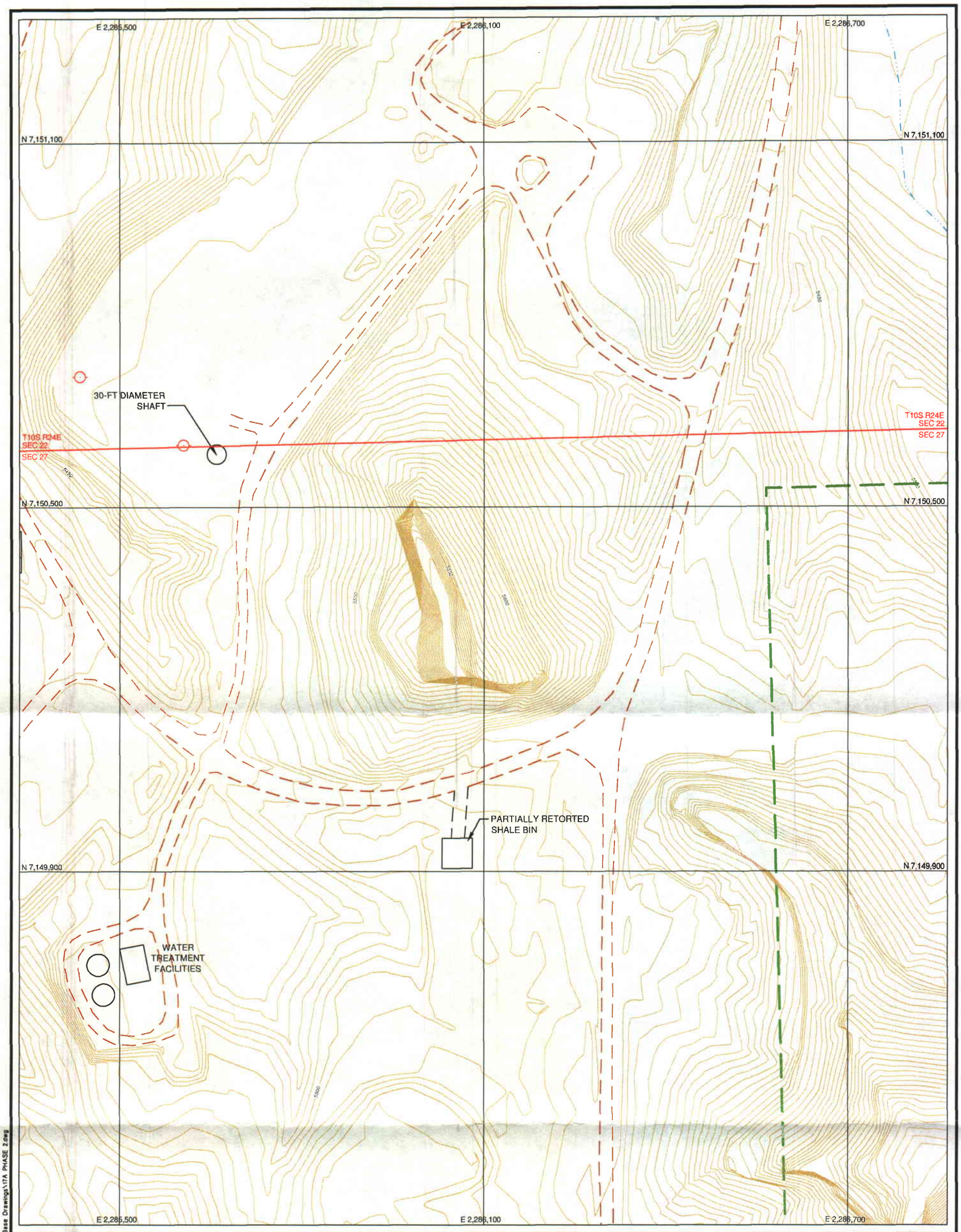
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
PHASE 2
SPENT SHALE PILE CROSS-SECTIONS

MWH

Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 16

N:\Design-Drafting\Clients i-P\OSEC\1005215 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\16 PHASE 2



LEGEND

- LEASE BOUNDARY
- DIRT ROAD
- NATURAL DRAINAGE
- BUILDING
- TANK
- MINE ADIT
- POWER POLE

NOTE:

1. DRAWING COORDINATES BASED ON NAD83 UTAH CENTRAL AERIAL TOPOGRAPHY SUPPLIED BY OLYMPUS AERIAL SURVEYS INC., AUGUST 29,2006.
2. LEASE AREA IS LOCATED IN TOWNSHIP 10S RANGE 24.

N

SCALE
150' 0 150'
CONTOUR INTERVAL 5FT.

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
B	Issued For Final	06/09	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

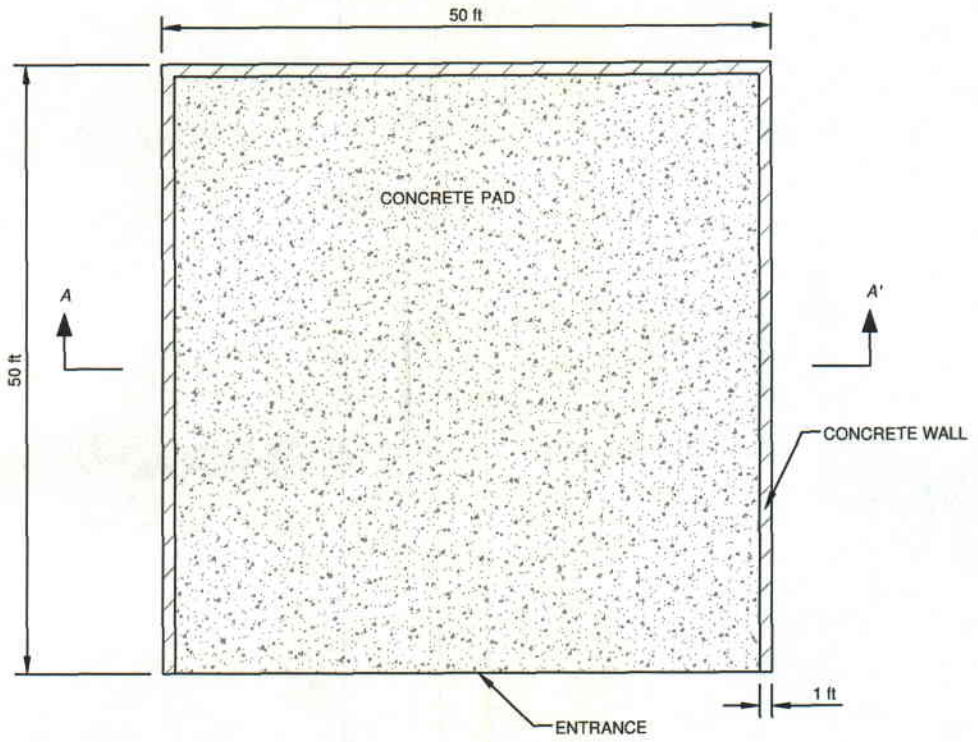
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
PHASE 2
PARTIALLY RETORTED SHALE BIN

MWH

Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 17A

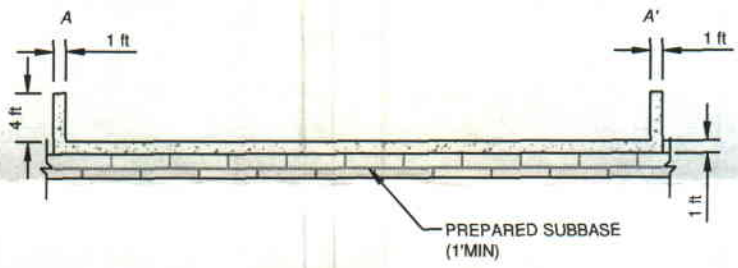
N:\Design-Drafting\Clients\P:\OSEC\1005215 Phase 2 Rev 3 Apr 2008\Base Drawings\17A PHASE 2.dwg



PLAN VIEW

SCALE

0 15'



SECTION A-A'

SCALE

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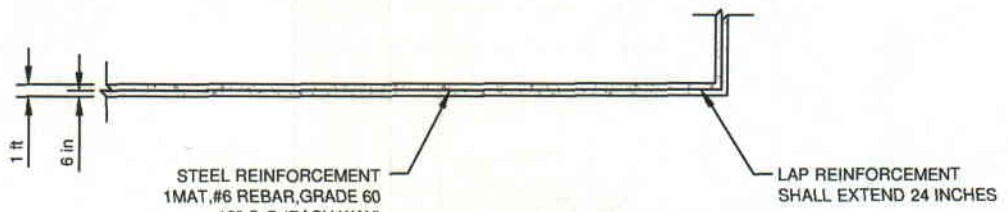


TYPICAL CONCRETE SECTION

SCALE

0 15'

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
8	Issued For Final	06/08	R.Martin	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
PHASE 2
PARTIALLY RETORTED SHALE BIN
PLAN AND SECTIONS

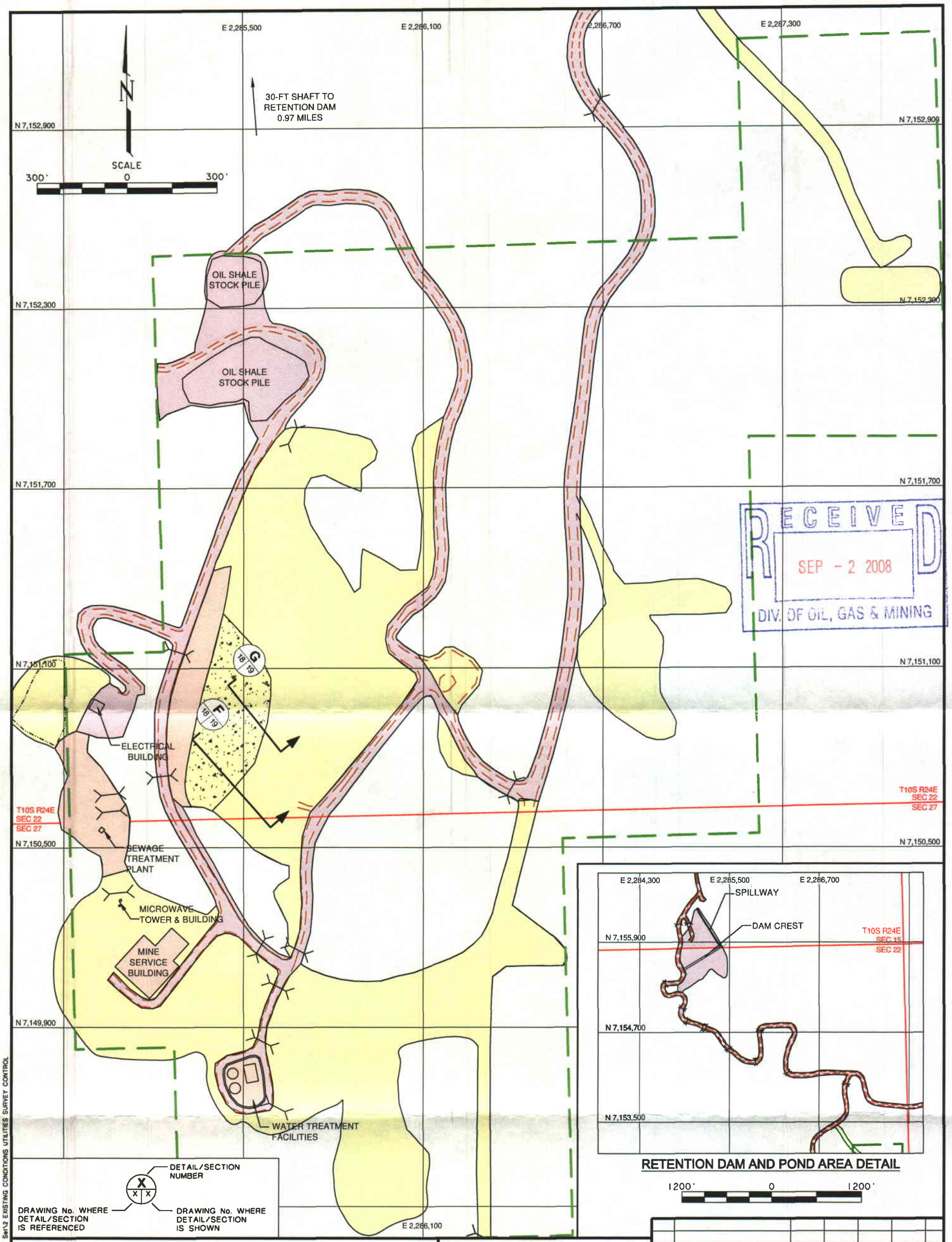
MWH

Sheet 1 Of 1 Sheets

SCALE: As Shown

FIGURE No. 17B

N:\Design-Drafting\Clients I-P\OSEC\1005215 Phase 2 Rev 3 Apr 2008\Base Drawings\17B PHASE 2.dwg



RETENTION DAM AND POND AREA DETAIL

1200' 0 1200'

LEGEND

- LEASE BOUNDARY
- DIRT ROAD
- NATURAL DRAINAGE
- BUILDING
- TANK
- MINE ADIT
- POWER POLE
- SURFACE WATER FLOW DIRECTION
- SHAFT
- CULVERT
- PROPOSED FACILITY
- PIPE LINE
- POWER LINE
- PREVIOUSLY DISTURBED AREA (NOT OCCUPIED)
- AREA TO BE LEFT AS IS AFTER PHASE 2
- AREA TO BE RIPPED, TOPSOILED, AND SEEDED
- AREA TO BE REGRADED, TOPSOILED, AND SEEDED

NOTE:

1. DRAWING COORDINATES BASED ON NAD83 UTAH CENTRAL AERIAL TOPOGRAPHY SUPPLIED BY OLYMPUS AERIAL SURVEYS INC., AUGUST 29,2006.
2. CORNER POINTS SURVEYED BY TRI-STATE LAND SURVEYING INC. 180 N.VERNAL AVE. VERNAL, UT 84078
   SURVEYOR: STACY STEWART, UTAH LICENSED SURVEYOR. # 189377.
3. LEASE AREA IS LOCATED IN TOWNSHIP 10S RANGE 24E.
4. ALL OFF-LEASE ROADS HAVE 40 FT WIDE R.O.W.'S.

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B	Issued For Final	08/08	K.Knoop	C.Fowler	C.Tomlinson

OSEC
Oil Shale Exploration Company, LLC

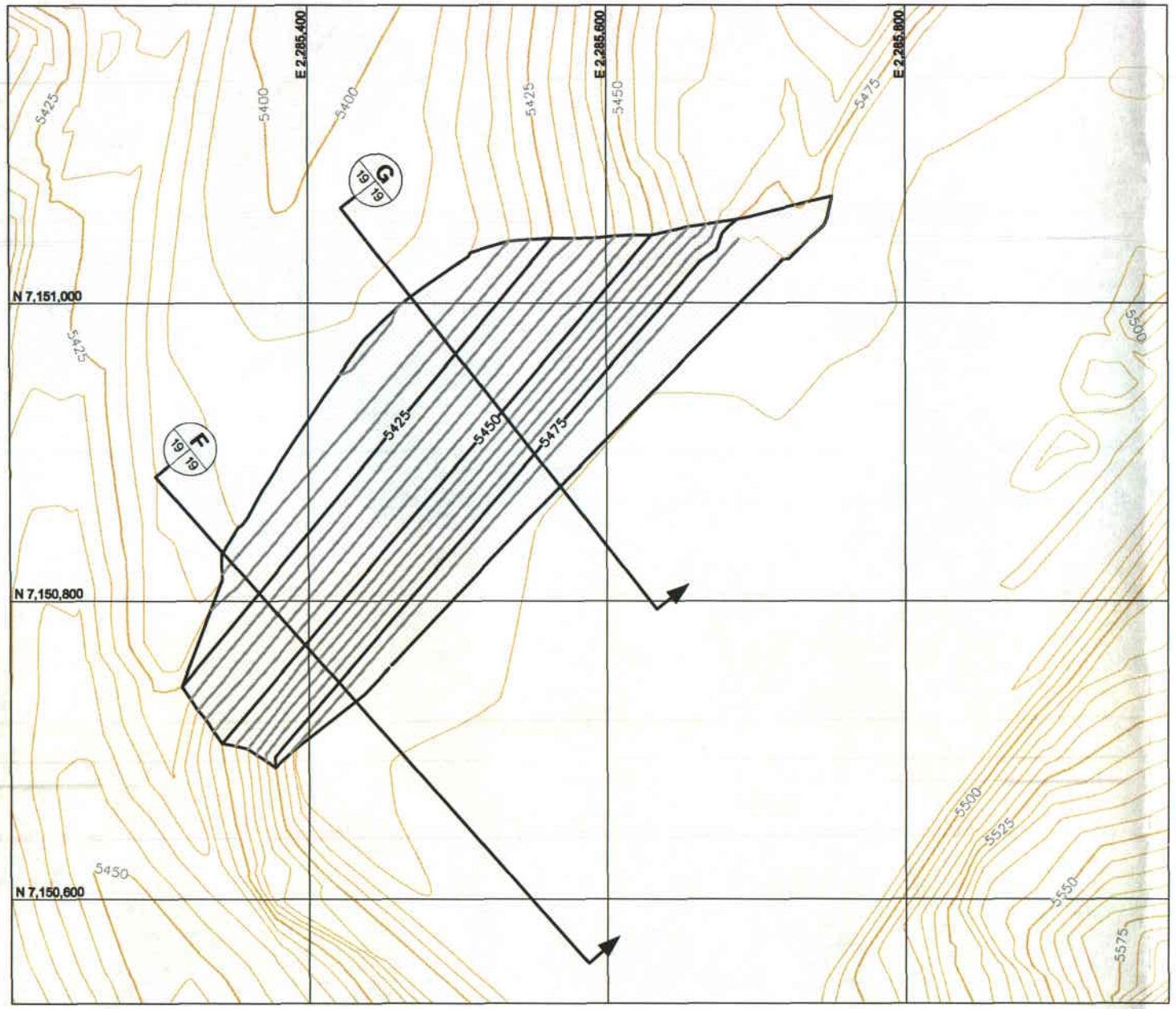
PROJECT:
WHITE RIVER OIL SHALE MINE

DRAWING TITLE:
PROPOSED PHASE 2 OPERATIONS RECLAMATION TREATMENTS

MWH

Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 18

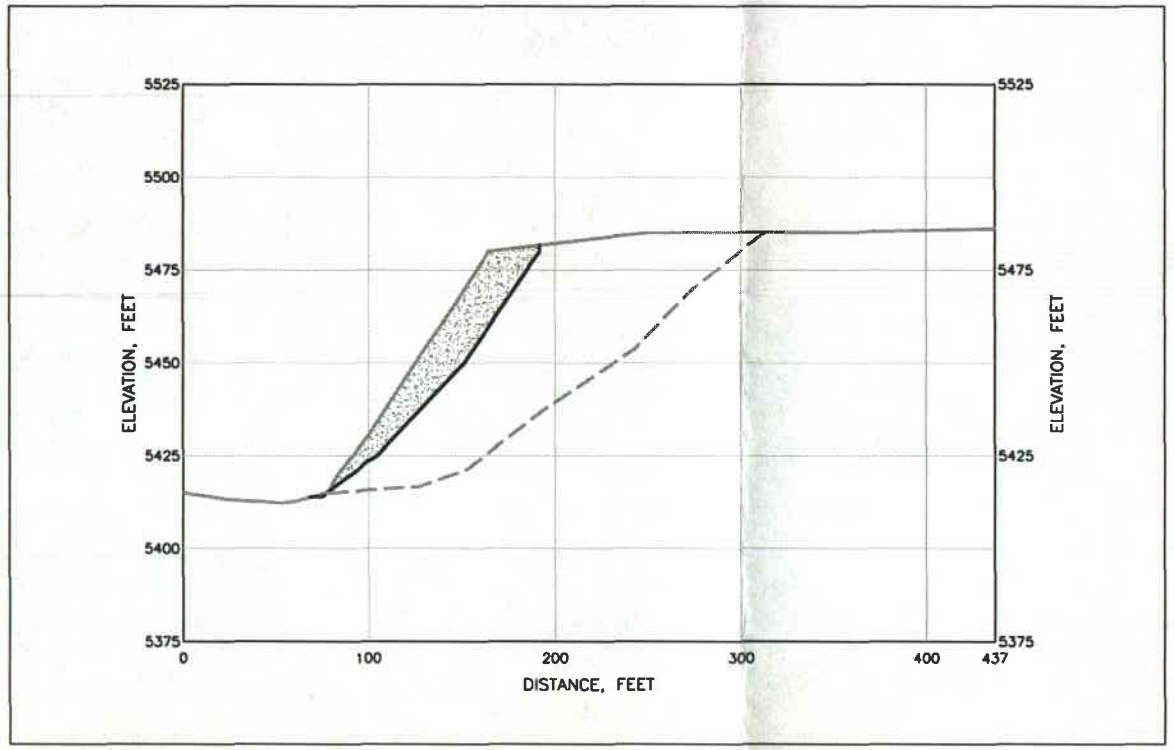
J:\100525 OSEC\Phase II Spent Oil Shale Stockpile Plans\Sheet Set\2 EXISTING CONDITIONS UTILITIES SURVEY CONTROL



PLAN VIEW

0 100'

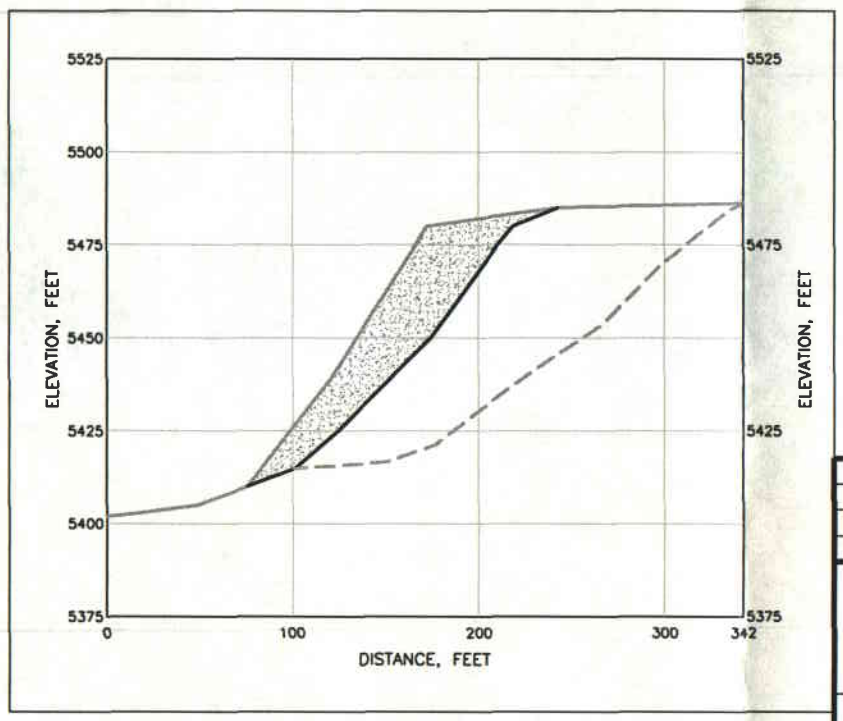
SCALE



F 18 19 SECTION F

0 100'

VERTICAL EXAGGERATION=2X



G 18 19 SECTION G

0 100'

VERTICAL EXAGGERATION=2X

LEGEND

- EXISTING SHAFT WASTEPILE SURFACE
- REGRADED SURFACE
- APPROXIMATE ORIGINAL GROUND SURFACE
- MATERIAL REMOVED FROM EXISTING SHAFT WASTE PILE, USED TO BACKFILL SHAFTS

X / X — DETAIL/SECTION NUMBER; DRAWING No. WHERE DETAIL/SECTION IS REFERENCED; DRAWING No. WHERE DETAIL/SECTION IS SHOWN

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OSEC — Oil Shale Exploration Company, LLC

PROJECT: *WHITE RIVER OIL SHALE MINE*

DRAWING TITLE: *GRADING PLAN DETAIL WITH CROSS SECTIONS*

MWH

Sheet 1 Of 1 Sheets

SCALE: As Shown

FIGURE No. 19

N:\Design-Drafting\Clients I-P\OSEC\1005215 Phase 2 Rev 3 Apr 2008\Sheet Set Drawings\19 GRADING PLAN DETAIL